Appendix E: Traffic and Circulation

CUMBERLAND ROAD CONTRIBUTIONS
(12/16/03)

Tentative Tract No.	Frontage Length	One Side or Both Sides	Cost of Remaining 0.8 Miles (26 -ft wide pavement)	Total Cost of frontage (26-ft wide)	Total Cost based on Per-Lot Allotment	Notes
TR 15740	1,850.00	One Side	$1,572,479.53	**$344,352.17**	**$301,183.12**	**Frontage is Paved**
TR16185	815.00	Both sides	$1,572,479.53	**$303,402.18**	**$126,346.17**	**Developer is paving His frontage As part of Development**
Total				**$647,754.35**	**$427,529.28**	

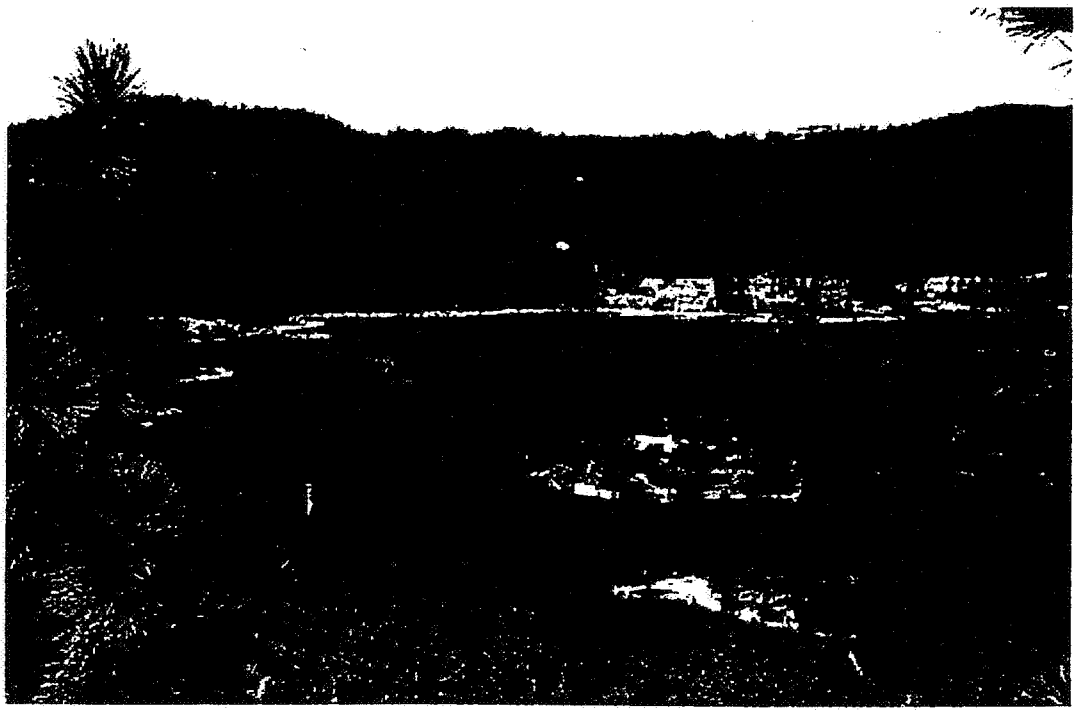
Tentative Tract No.	Fee Per Tract 12783 Deposit (136 Lots)	Per Lot Fee	Construction Index Adjustment	Adjusted Per Lot Fee	No. of Lots in Tentative Tracts (or equivalent)	Total Fee	Fee per Tract
TR 15740 (Residential)	$193,633.97	$1,423.78	1.53	$2,178.38	72.00	$156,843.52	
TR 15740 (Commercial)*	$193,633.97	$1,423.78	1.53	$2,178.38	**66.26**	$144,339.60	**$301,183.12**
TR 16185 (Residential)	$193,633.97	$1,423.78	1.53	$2,178.38	58.00	$126,346.17	**$126,346.17**

***See Below**

Tebtative Tract No. 12783 Type of Commercial Space	Sqaure Footage	Trip GenerationPer 1000 Square Feet (ADT)	Trip Generation	Total Trip Generation	Traffic generation Residential Equivalent
Office	4,000.00	11.00	44.00		
Retail	10,200.00	43.00	438.60		
Restaurant	2,000.00	90.00	180.00	662.60	
Residential Per Lot				10.00	**66.26**

TRAFFIC IMPACT ANALYSIS

BLUE RIDGE AT LAKE ARROWHEAD
(TENTATIVE TRACT NO. 16185)



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February 7, 2002

TRAFFIC IMPACT ANALYSIS

BLUE RIDGE AT LAKE ARROWHEAD (TENTATIVE TRACT NO. 16185)

Submitted to:

Mr. Andrew Bodewin
Hawarden Development Corporation
6949 Chartwell Drive
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Prepared by:

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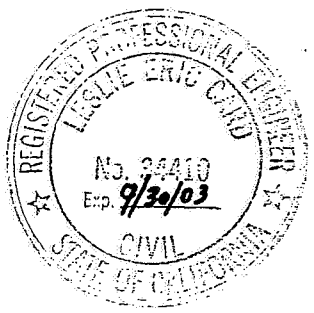
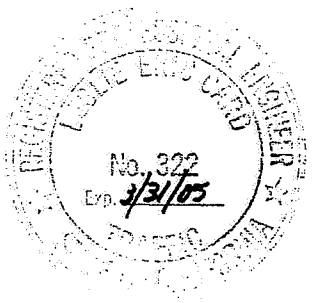
LSA Project No. HWD030



Prepared Under the Supervision of:

Les Card, P.E.



LSA

February 7, 2002

TABLE OF CONTENTS

BLUE RIDGE AT LAKE ARROWHEAD
TRAFFIC IMPACT ANALYSIS

INTRODUCTION

This traffic impact analysis (TIA) has been prepared to assess the potential traffic and circulation impacts associated with the development of the proposed Blue Ridge at Lake Arrowhead residential development. This report is intended to satisfy the requirement for a traffic impact analysis established by the County of San Bernardino and the requirement for the disclosure of potential impacts and mitigation measures per the California Environmental Quality Act (CEQA).

Prior to preparation of the TIA, a preliminary assessment was performed to determine the estimated trip generation for the proposed project. At build out, the proposed 58 single family dwelling unit project is forecast to generate 44 vehicle trips during the a.m. peak hour and 59 trips during the p.m. peak hour. This is less than the 250 peak hour trip threshold established by the San Bernardino County Congestion Management Program (CMP) for preparation of a traffic impact analysis.

This report analyzes project related traffic impacts for the proposed project under existing 2001 and cumulative year 2020 conditions, which includes the development of the approved Mill Pond project. The Mill Pond project is a mixed-use project containing single family homes, lodging, retail/ restaurant and office land uses located north of the project site. Traffic data for this approved project were taken from the Mill Pond at Lake Arrowhead Traffic Study prepared by Lawerence Eisenhart, P.E., in July, 1996[1].

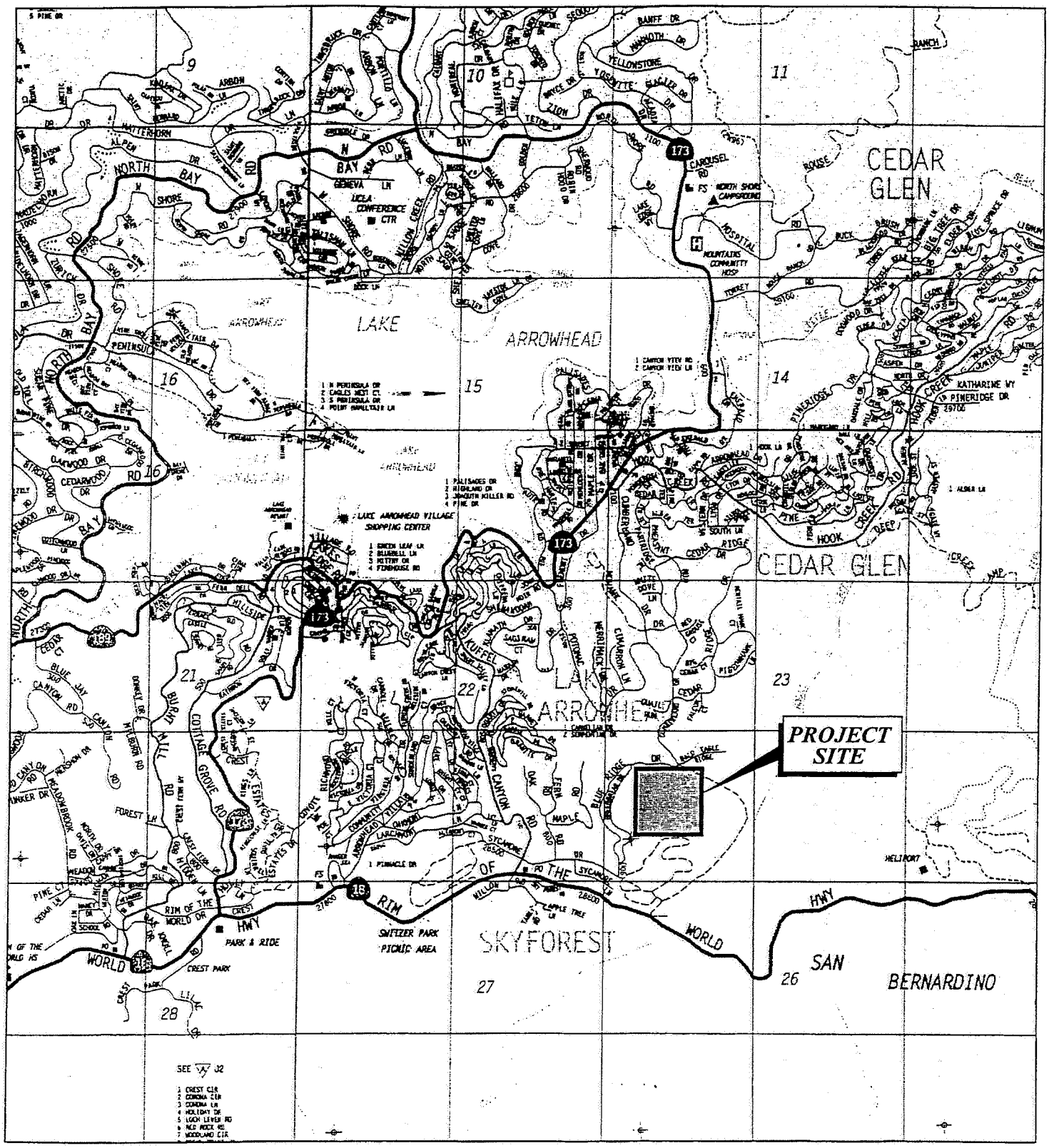
Project Description

The Blue Ridge at Lake Arrowhead residential development project is proposed to be located at the southern terminus of Cumberland Drive, east of Blue Ridge Drive in the community of Cedar Glen, in the Lake Arrowhead area of San Bernardino County (see Figure 1). Figure 2 illustrates the project site plan. The project proposes to develop 58 single family dwelling units on approximately 39.8 acres of land. Regional access to and from the site will be provided from State Highway 173 (SR-173); local access will be provided via an extension of Cumberland Drive. Currently, Blue Ridge Drive is gated at its intersection with Cumberland Drive. Blue Ridge Drive is designated as an emergency access, and through traffic is prohibited. With development of the project, Blue Ridge Drive will continue to be gated for emergency access only.

Analysis Methodology

This TIA was prepared consistent with criteria established by the County of San Bernardino. In addition to ambient growth for the future analysis year (2020), the County has requested that traffic generated by the approved Mill Pond at Lake Arrowhead project (Tentative Tract No. 15740) be added to the background year 2020 condition. The forecast traffic assignment from the Mill Pond project was taken from the Mill Pond at Lake Arrowhead traffic study (Lawrence Eisenhart, P.E., July 1996). This study evaluates four scenarios:

1 Mill Pond at Lake Arrowhead Traffic Study, Lawrence Eisenhart, P.E., July 1996.



LSA

FIGURE 1

N

0 1200 2400

FEET

Blue Ridge

Project Location

SOURCE: The Thomas Guide, San Bernardino County, 2000.

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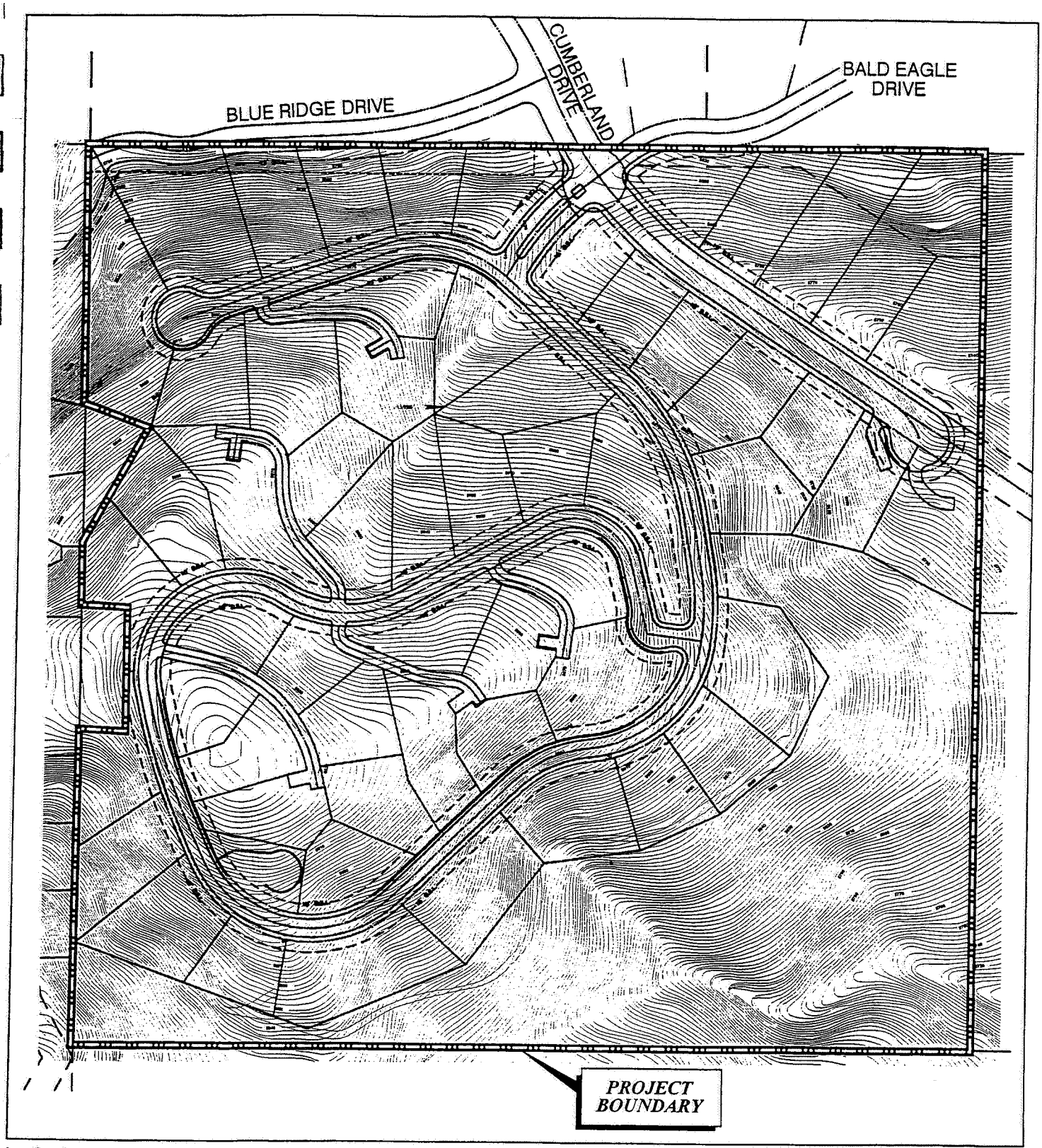

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FIGURE 2

N

0 100 200
FEET

Blue Ridge
Site Plan

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- Peak season 2001 conditions
- Peak season 2001 plus project conditions
- Future year 2020 background (without project) conditions with approved Mill Pond project
- Future year 2020 plus project conditions with approved Mill Pond project.

This analysis examines a.m. and p.m. peak hour conditions for each scenario.

Study Area

The study area for the traffic analysis was defined in consultation with the County of San Bernardino Traffic Engineer. The intersection of SR-173/Hook Creek Road-Oak Drive has been selected for analysis for the four scenarios in the a.m. and p.m. peak hours. SR-173/Hook Creek Road-Oak Drive is an unsignalized intersection with stop control on the minor street approaches (Hook Creek Road and Oak Drive). In addition, a slight offset exists where Hook Creek Road and Oak Drive connect with SR-173. The location and geometrics of SR-173/Hook Creek Road-Oak Drive are illustrated on Figure 3.

Level of Service Definitions and Procedures

Roadway operations and the relationship between capacity and traffic volumes are generally expressed in terms of levels of service. These levels recognize that, while an absolute limit exists as to the amount of traffic moving through a given intersection (the absolute capacity), the conditions that motorists experience rapidly deteriorate as traffic approaches the absolute capacity. Under such conditions, congestion is experienced. There is general instability in the traffic flow, which means that relatively small incidents (e.g., momentary engine stall) can cause considerable fluctuations in speeds and delays. This near capacity situation is labeled LOS E (levels of service are designated A through F). Beyond LOS E, capacity has been exceeded, and arriving traffic will exceed the ability of the intersection to accommodate it. An upstream queue will then form and continue to expand in length until the demand volume declines.

A complete description of the meaning of level of service can be found in the Highway Research Board Special Report 209, *Highway Capacity Manual*. The Manual establishes levels of service A through F. Brief descriptions of the six levels of service, as abstracted from the Manual, are as follows:

Level of Service Definitions

LOS	Description
A	No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Typically, the approach appears quite open, turns are made easily and nearly all drivers find freedom of operation.
B	This service level represents stable operation, where an occasional approach phase is fully utilized and a substantial number are approaching full use. Many drivers begin to feel restricted within platoons of vehicles.

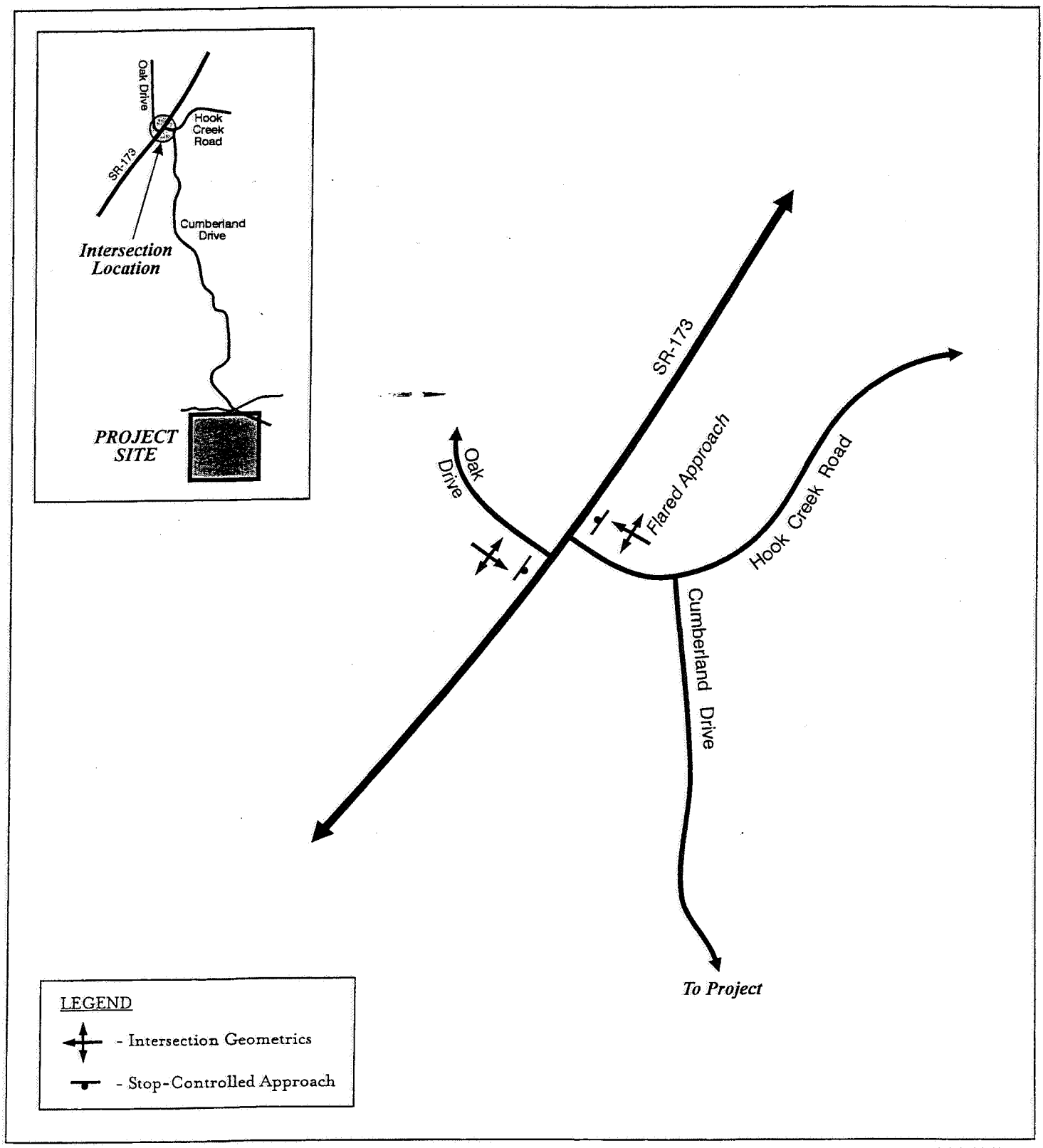

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FIGURE 3

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SCHEMATIC - NOT TO SCALE

SOURCE: The Thomas Guide, San Bernardino County, 2000.

Blue Ridge

Existing Intersection Location and Geometrics

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C This level still represents stable operating conditions. Occasionally drivers may have to wait through more than one red signal indication, and backups may develop behind turning vehicles. Most drivers feel somewhat restricted, but not objectionably so.

D This level encompasses a zone of increasing restriction approaching instability at the intersection. Delays to approaching vehicles may be substantial during short peaks within the peak period; however, enough cycles with lower demand occur to permit periodic clearance of developing queues, thus preventing excessive backups.

E Capacity occurs at the upper end of this service level. It represents the most vehicles that any particular intersection approach can accommodate. Full utilization of every signal cycle is seldom attained no matter how great the demand.

F This level describes forced flow operations at low speeds, where volumes exceed capacity. These conditions usually result from queues of vehicles backing up from a restriction downstream. Speeds are reduced substantially and stoppages may occur for short or long periods of time due to the congestion. In the extreme case, both speed and volume can drop to zero.

The level of service for unsignalized and signalized intersections can be described as follows:

Level of Service	Unsignalized Intersection Control Delay Per Vehicle (sec.)	Signalized Intersection Control Delay Per Vehicle (sec.)
A	≤ 10	≤ 10
B	> 10 and ≤ 15	> 10 and ≤ 20
C	> 15 and ≤ 25	> 20 and ≤ 35
D	> 25 and ≤ 35	> 35 and ≤ 55
E	> 35 and ≤ 50	> 55 and ≤ 80
F	> 50	> 80

For the unsignalized study area intersection, the *Highway Capacity Manual* (HCM 2000) unsignalized analysis methodology was used to determine intersection levels of service. All levels of service were calculated using the Highway Capacity Software (HCS2000) and/or TRAFFIX version 7.5 level of service software, which also uses the HCM 2000 methodologies.

Level of Service Threshold Criteria

The County of San Bernardino defines LOS C as the threshold for satisfactory intersection operations. Therefore, any level of service condition in excess of LOS C is considered an impact requiring mitigation.

EXISTING CONDITIONS

Existing Roadway System

An inventory of the existing study area street system was conducted by LSA in February 2001. Adjacent to the project, Cumberland Drive is a two lane undivided roadway that provides local access to

Cedar Glen and Lake Arrowhead. Currently, Blue Ridge Drive west of the project site is gated at its intersection with Cumberland Drive-Bald Eagle Ridge. Blue Ridge Drive is designated as an emergency access route, and through traffic is prohibited. Cumberland Drive provides access to SR-173, which provides regional access within the Lake Arrowhead area, including State Highway 18 (SR-18). SR-18 provides regional access to the Big Bear Lake area to the northeast and the employment centers of San Bernardino County to the west and south.

Existing Peak Season Traffic Conditions

Peak hour traffic counts for SR-173/Hook Creek Road-Oak Drive were collected by LSA in February 2001. Traffic count data sheets are provided in Appendix A. For traffic analyses, San Bernardino County requires examination of peak season (June to September) conditions. Caltrans count data for the highways in the project vicinity indicate that peak season volumes are approximately 20 percent greater than non-peak season volumes. The February counts were increased by 20 percent to reflect peak season conditions. Figure 4 illustrates the existing peak season a.m. and p.m. peak hour turn volumes for the study area intersection. Table A presents the existing condition intersection level of service analysis summary. Actual level of service worksheets are provided in Appendix B.

Table A: Existing Peak Season 2001 Intersection Levels of Service

Intersection	Approach	A.M. Peak Hour		P.M. Peak Hour	
		Delay	LOS	Delay	LOS
SR-173/Hook Creek Road-Oak Drive	Eastbound	11.6 sec.	B	12.6 sec.	B
	Westbound	7.3 sec.	A	9.3 sec.	A

As this summary indicates, the delays at the unsignalized intersection's minor street approaches are currently within the County's LOS C threshold.

PROJECT TRAFFIC

Project Trip Generation

Trip generation for the proposed Blue Ridge residential project was developed using trip rates provided in the Institute of Transportation Engineers (ITE) *Trip Generation, Sixth Edition.* 1 A summary of the trip generation rates and resulting vehicle trips for the proposed project is presented in Table B.

Table B: Blue Ridge at Lake Arrowhead Trip Generation

Land Use/Size	ADT	A.M. Peak Hour			P.M. Peak Hour		
		In	Out	Total	In	Out	Total
TRIP RATES							
Per Single Family Dwelling Unit	9.57	0.19	0.56	0.75	0.65	0.36	1.01
TRIP GENERATION							
58 Single Family Dwelling Units	***555***	***11***	***33***	***44***	***38***	***21***	***59***

According to Table B, the proposed project would generate approximately 555 average daily trips (ADT), 44 a.m. peak hour trips, and 59 p.m. peak hour trips.

1 *Trip Generation* (6th Edition), Institute of Transportation Engineers, Washington, D.C., 1997.

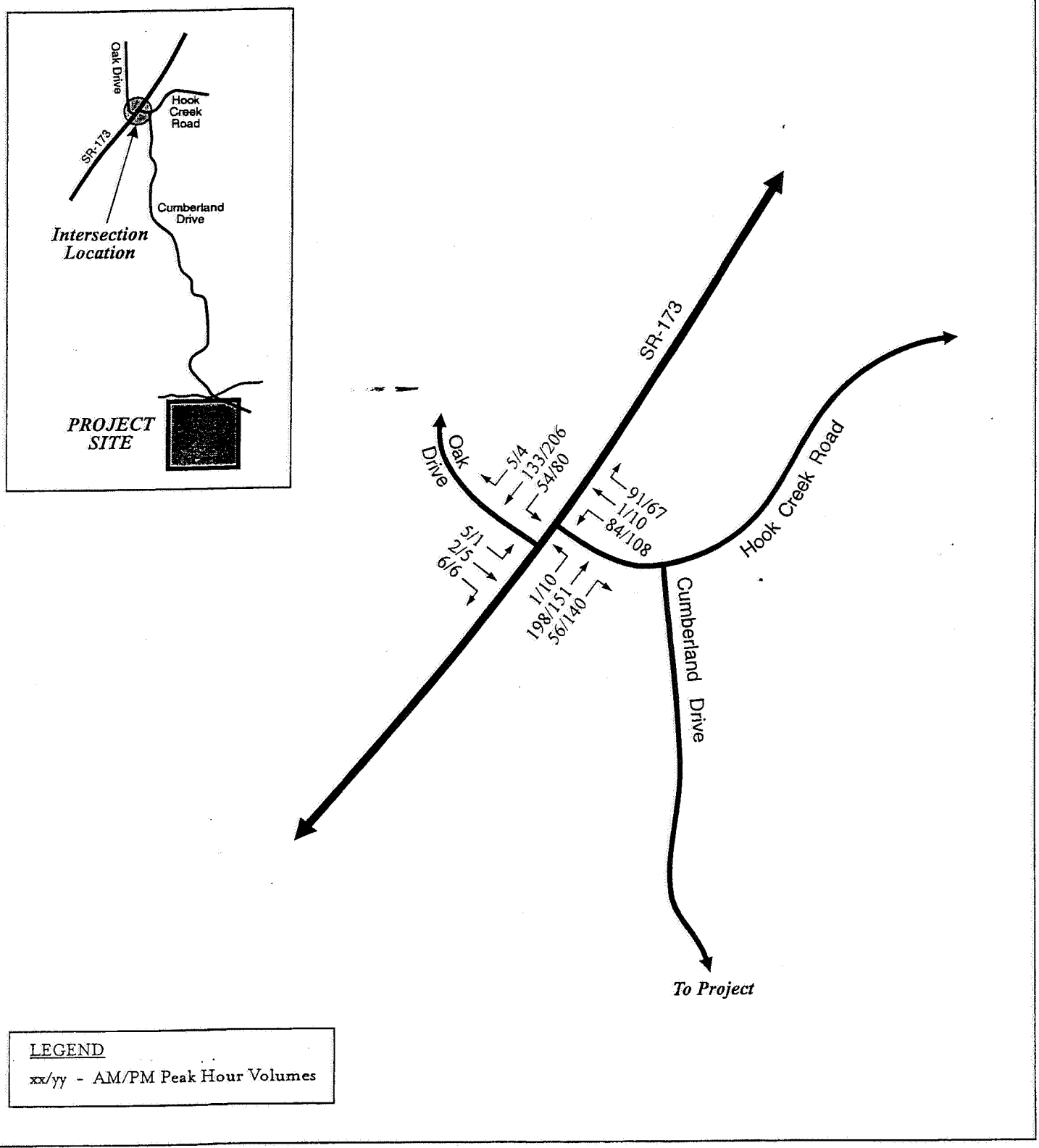

FIGURE 4

LSA

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SCHEMATIC - NOT TO SCALE

SOURCE: The Thomas Guide, San Bernardino County, 2000.

Blue Ridge

Existing Peak Season AM and PM Peak Hour Traffic Volumes

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Project Trip Distribution and Assignment

Trip distribution and assignment patterns were developed based on the location of the proposed project site relative to the existing commute and local travel patterns made by existing residential land uses in the immediate area. Figure 5 illustrates the generalized trip distribution patterns and the resulting trip assignment.

According to Figure 5, approximately 30 percent of project traffic is forecast to travel to/from the northeast on SR-173 towards other parts of Cedar Glen and the north shore area of Lake Arrowhead, while 70 percent of the project traffic is forecast to travel to/from the southwest on SR-173 towards Lake Arrowhead and SR-18.

EXISTING PLUS PROJECT CONDITIONS

Potential project impacts to the local circulation system in the existing condition are determined by adding the trip assignment to the existing (2001) background traffic condition. Figure 6 illustrates the resulting existing plus project a.m. and p.m. peak hour traffic volumes.

Existing Peak Season Plus Project Levels of Service

Table C shows the existing plus project a.m. and p.m. peak hour levels of service for the SR-173/Hook Creek Road-Oak Drive intersection.

Table C: Existing Peak Season Plus Project Intersection Levels Of Service

		Existing Conditions				Existing Plus Project			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
SR-173/	Eastbound	11.6 sec.	B	12.6 sec.	B	11.8 sec.	B	13.0 sec.	B
Hook Creek	Westbound	7.3 sec.	A	9.3 sec.	A	7.3 sec.	A	9.7 sec.	A

As Table C indicates, addition of project traffic to existing traffic at the SR-173/Hook Creek Road-Oak Drive intersection will not cause the minor street approaches to operate at unsatisfactory levels of service. The minor streets at this intersection are forecast to continue to operate at LOS B or better during the a.m. and p.m. peak hours in the existing plus project condition.

YEAR 2020 BACKGROUND CONDITIONS

In addition to the existing conditions, project impacts were also assessed relative to forecast year 2020 conditions. Traffic volume data for the 2020 background (without project) condition are based on forecasts supplied from the San Bernardino Mountain Traffic Model. The San Bernardino Mountain traffic model was developed to forecast future traffic conditions for the mountain area. This model uses a 1990 base condition and a 2010 future condition. To determine the a.m. and p.m. peak season, peak hour intersection turn movements for the 2020 background conditions, the following methodology was used:

1. The modeled 1990 and 2010 arterial Average Daily Traffic (ADT) volumes for each intersection leg were examined to determine the annual growth rate projected by the model.

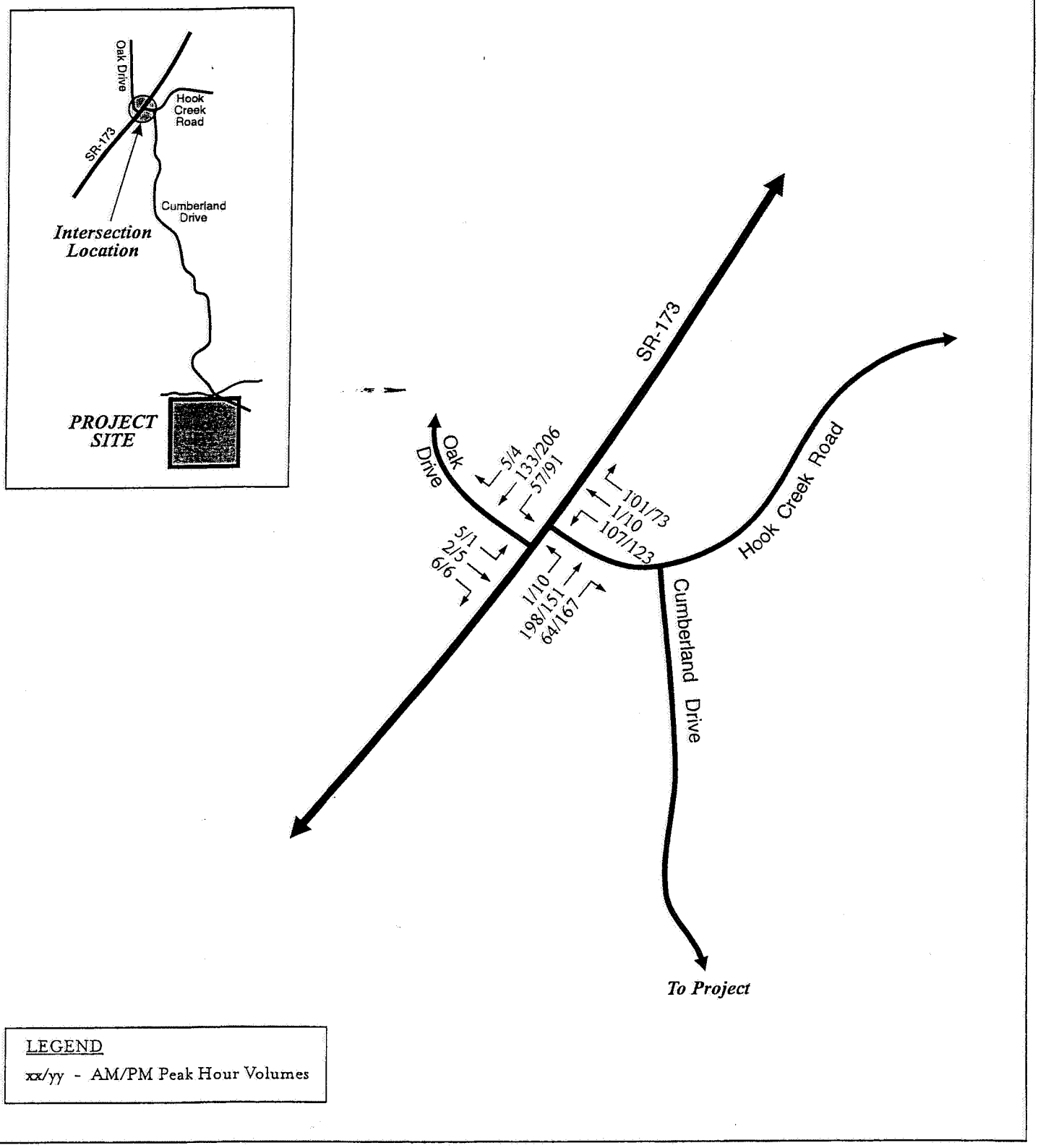

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FIGURE 6

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SCHEMATIC - NOT TO SCALE

SOURCE: The Thomas Guide, San Bernardino County, 2000.

Blue Ridge

Existing Peak Season Plus Project
AM and PM Peak Hour Traffic Volumes

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2. The annual growth rate for each intersection leg was multiplied by 19 (2020 minus 2001) to develop growth rates for the year 2020 planning horizon.
3. Existing peak season intersection approach and departure volumes (based on actual ground counts) were multiplied by the appropriate modeled 19 year growth factor, resulting in "post-processed" forecast year 2020 link volumes.
4. Forecast year 2020 turn volumes were developed using existing turn volumes and the future approach and departure volumes based on the methodologies contained in the National Cooperative Highway Research Program Report (NCHRP) 255: *Highway Traffic Data for Urbanized Area Project Planning and Design*[1]. The worksheets used to develop the forecast 2020 background traffic volumes are contained in Appendix C.
5. In addition to year 2020 ambient growth, the County has requested that traffic generated by the approved Mill Pond at Lake Arrowhead project (Tentative Tract No. 15740) be added to the background year 2020 condition. The forecast traffic assignment from the Mill Pond project was taken from the Mill Pond at Lake Arrowhead Traffic Study (Lawrence Eisenhart, P.E., July, 1996), and is provided in Appendix D.

Figure 7 illustrates the resulting 2020 background (with Mill Pond) a.m. and p.m. peak hour intersection turn volumes. Table D presents the 2020 background intersection level of service analysis summary. Actual level of service worksheets are provided in Appendix B.

Table D: Year 2020 Background Intersection Levels of Service

Intersection	Approach	A.M. Peak Hour		P.M. Peak Hour	
		Delay	LOS	Delay	LOS
SR-173/Hook Creek Road-Oak Drive	Eastbound	39.1 sec.	E	39.0 sec.	D
	Westbound	35.0 sec.	D	>80 sec.	F

As indicated in Table D, both the eastbound and westbound approaches are projected to operate below level of service C during both the a.m. and p.m. peak hours under year 2020 background conditions. Per the County significance criteria, this intersection is forecast to operate at an unsatisfactory level of service.

Year 2020 Background Conditions Signal Warrant Analysis

The desirability of signalizing existing intersections can be related to safety and traffic volume considerations. The need for signalization is determined through signal warrant analysis procedures established by the Federal Highway Administration (FHWA) and Caltrans. The Caltrans *Traffic Manual* provides 11 signal warrants for use in determining whether intersections should be signalized. According to the *Traffic Manual*:

> *"The justification for the installation of a traffic signal at an intersection is based on the warrants stated in this Manual and in the Manual On Uniform Traffic Control Devices published by the Federal Highway Administration (FHWA). The decision to install a signal should not be based solely upon the warrants, since the installation of traffic signals may increase certain types of collisions. Delay, congestion, approach conditions, driver confusion, future land use or other evidence of the need for right of way assessment beyond that which could be provided by stop signs must be demonstrated."*

1 Transportation Research Board, December, 1982.

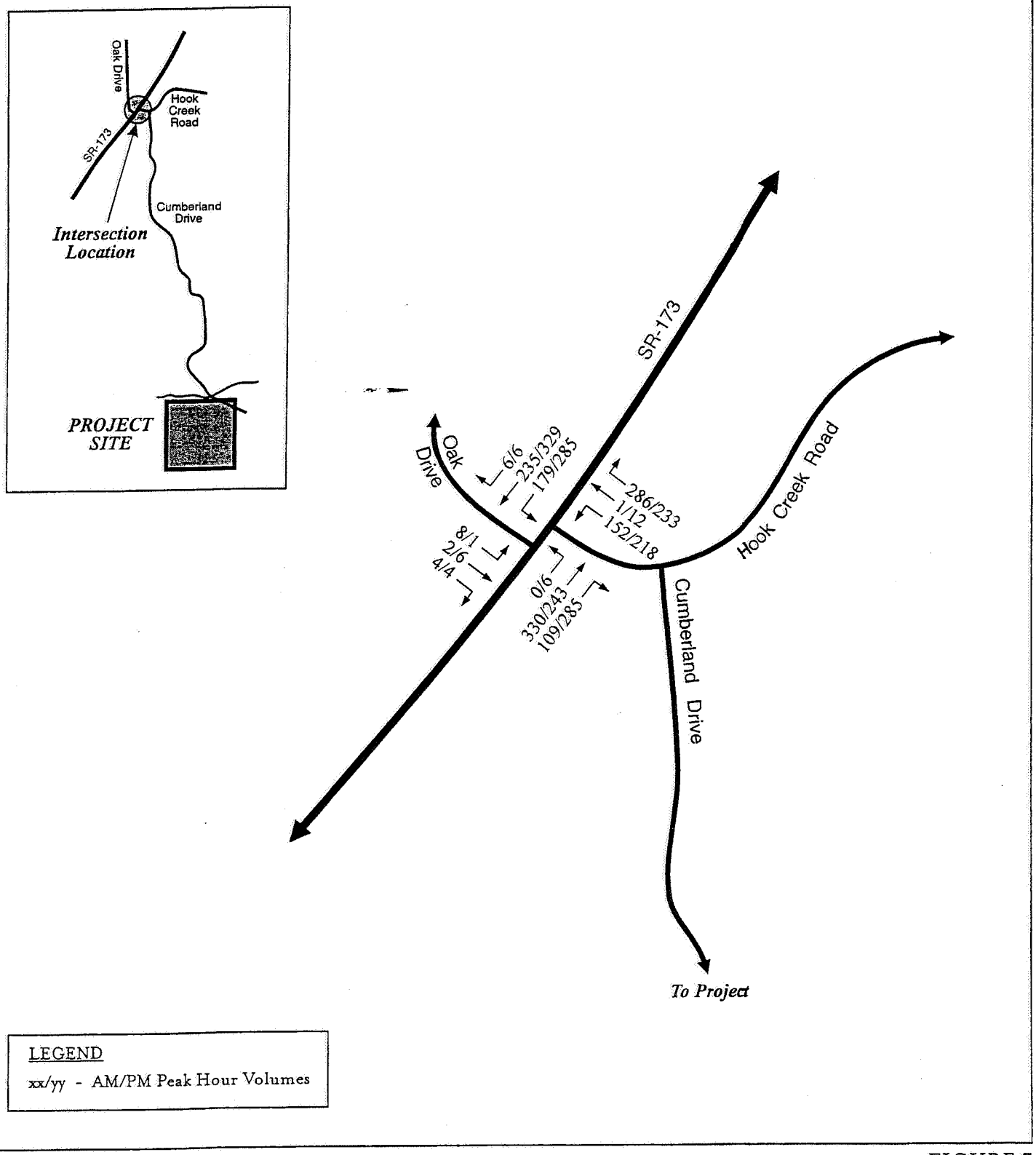

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FIGURE 7

Blue Ridge

Year 2020 Baseline (With Mill Pond)
AM and PM Peak Hour Traffic Volumes

SCHEMATIC - NOT TO SCALE

SOURCE: The Thomas Guide, San Bernardino County, 2000.

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Since this traffic analysis examines peak hour intersection volumes and impacts, the peak hour warrants were examined (per *Traffic Manual* Figure 9-9). It should be noted that the Caltrans Peak Hour Signal Warrant (Warrant 11) is the most stringent warrant in terms of analyzing the volume of traffic at an intersection. Generally, traffic conditions at the subject intersection are monitored (i.e., accident statistics, pedestrian volumes, 24 hour traffic volumes, etc.) after it is determined that signalization is warranted. At that time, and at the discretion of the jurisdiction's Traffic Engineer, all 11 signal warrants may be analyzed.

Peak hour signal warrants are based on the minimum approach volume requirements for the major street (total of both approaches) and the minor street (one direction only). These volume requirements have been established for two levels of development: urban and rural. According to Caltrans' *Traffic Manual*, "When the 85 percentile speed of major street exceeds 64 km/h (40 mph) in either an urban or rural area, or when the intersection lies within a built-up area of an isolated community having a population less than 10,000, the location is considered rural. All other areas are considered urban." Based on our observations of the operations of SR-173 in the project vicinity and our observations of the SR-173/Hook Creek Road-Oak Drive intersection, it was determined that the prevailing speeds on SR-173 in the vicinity of Hook Creek Road are about 40 mph. Therefore, this location meets the criteria for rural area intersections. Determination of whether an intersection warrants signalization is based on the plotting of major and minor street volumes on a graph (Figure 9-9 of the *Traffic Manual*). If the plotted point exceeds the threshold line, signalization is warranted in the peak hour.

Figure 8 illustrates the peak hour signal warrant graph for the intersection of SR-173/Hook Creek Road-Oak Drive for the 2020 background scenario. As this figure shows, the intersection will have sufficient approach volumes on the major street (SR-173), and the westbound approach (Hook Creek Road) may warrant signalization under 2020 background conditions with Mill Pond. According to the Conditions of Approval for the Mill Pond project (COA 96, page 14, November 3, 1998), the developer is required to deposit a fair-share contribution of approximately $140,000 for the future traffic signal at this location.

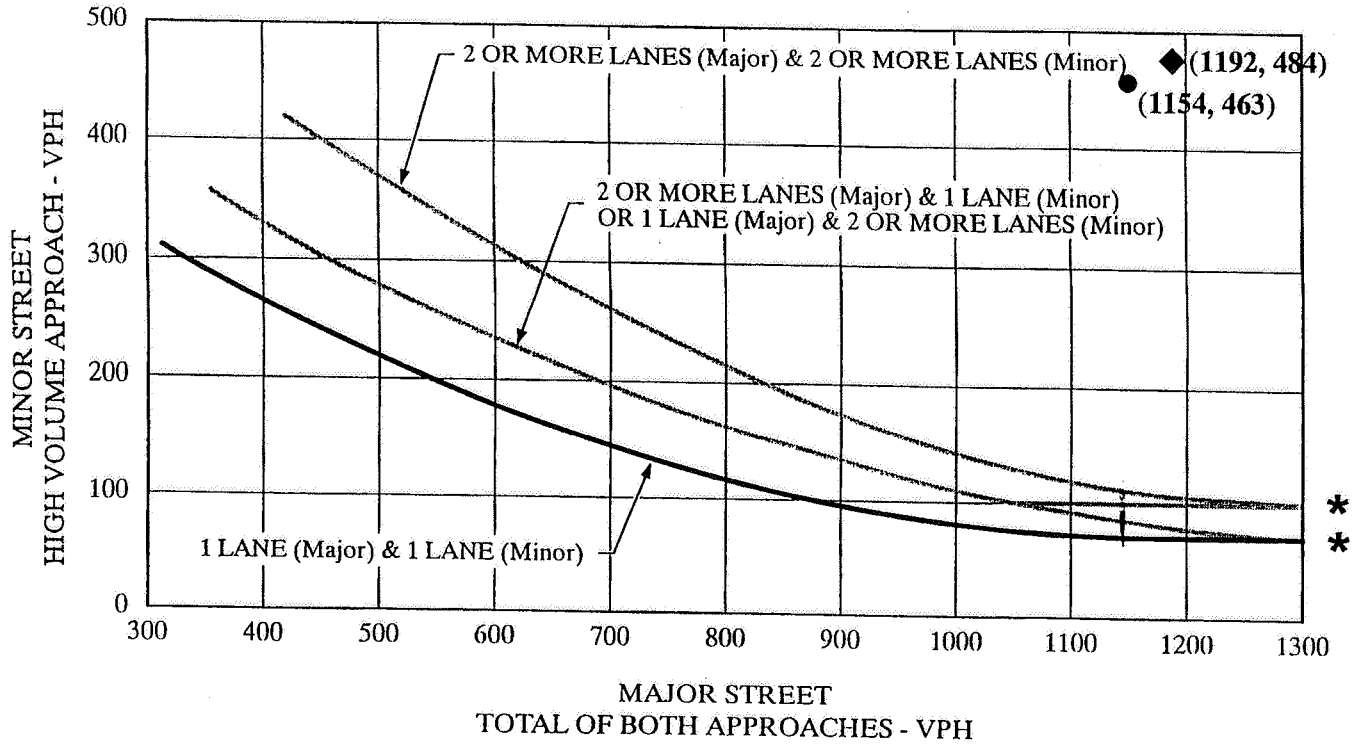
YEAR 2020 PLUS PROJECT CONDITIONS

Potential project impacts to the local circulation system in the year 2020 condition were determined by adding the project trip assignment to the year 2020 background traffic conditions discussed previously. Figure 9 illustrates the year 2020 background plus project a.m. and p.m. peak hour intersection turn volumes. Table E presents the 2020 plus project intersection level of service analysis summary. Actual level of service worksheets are provided in Appendix B.

Table E: Year 2020 Plus Project Intersection Levels of Service

		Year 2020 Background Conditions				Year 2020 Plus Project			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
SR-173/	Eastbound	39.1 sec.	E	39.0 sec.	E	36.9 sec.	E	42.5 sec.	E
Hook Creek	Westbound	35.0 sec.	D	>80 sec.	F	>80 sec.	F	>80 sec.	F

As indicated in Table E, both the eastbound and westbound approaches are projected to operate below level of service C during both the a.m. and p.m. peak hours under year 2020 plus project conditions.



* 100 VPH applies as the lower threshold volume for a minor street approach with two or more lanes and 75 VPH applies as the lower threshold volume for a minor street approaching with one lane.

WARRANT SATISFIED IN BOTH 2020 BASELINE AND 2020 BASELINE PLUS PROJECT CONDITIONS

LSA

FIGURE 8

LEGEND

SR-173/Hook Creek Road PM Peak Hour

● - Year 2020 Baseline

◆ - Year 2020 Baseline Plus Project

Blue Ridge

Peak Hour Signal Warrant Analysis

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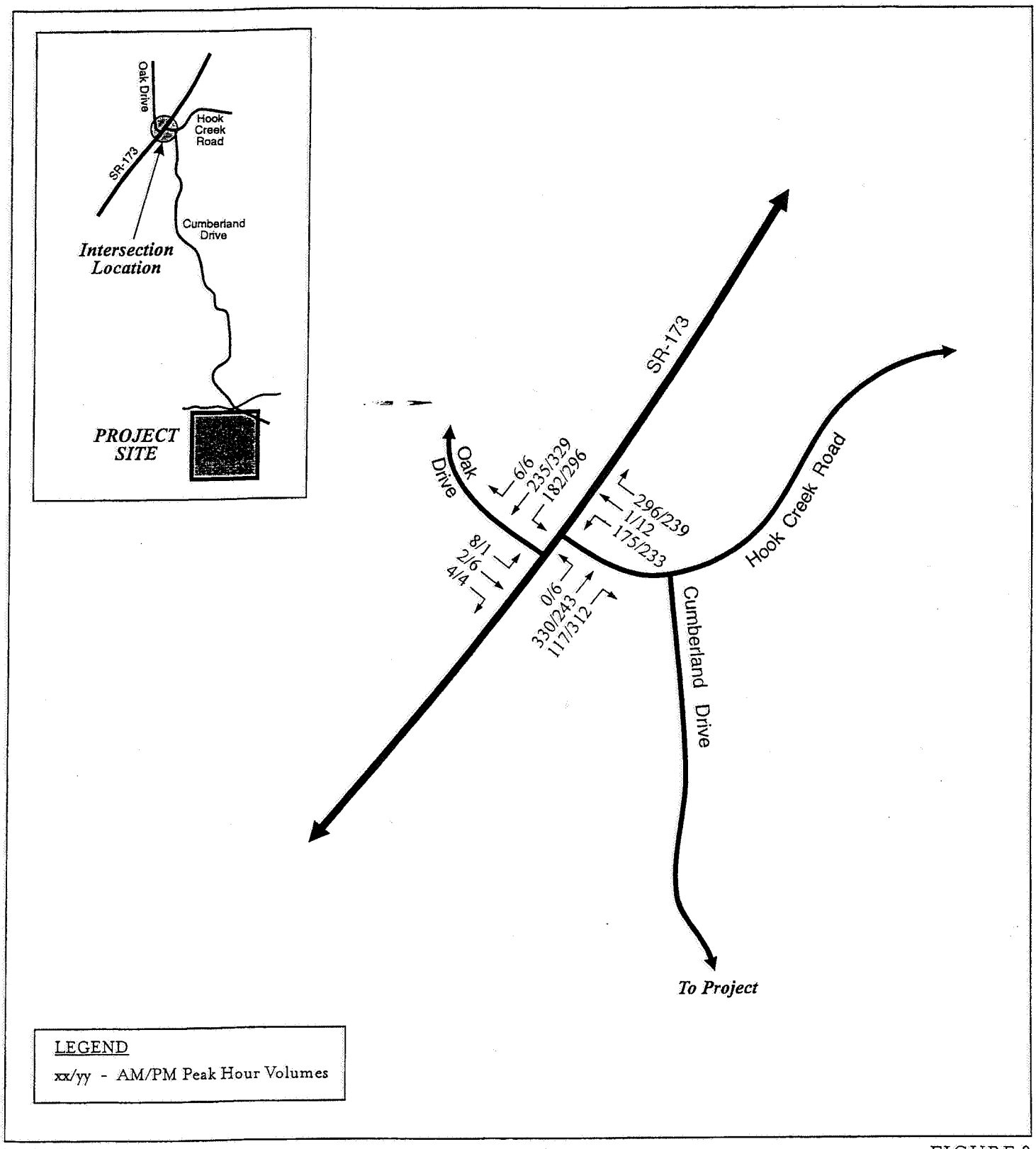

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FIGURE 9

Blue Ridge

Year 2020 Plus Project (With Mill Pond)
AM and PM Peak Hour Traffic Volumes

SCHEMATIC - NOT TO SCALE

SOURCE: The Thomas Guide, San Bernardino County, 2000.

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Per the County significance criteria, this intersection is forecast to operate at an unsatisfactory level of service. Therefore, development of the proposed project in the year 2020 condition will contribute to the unsatisfactory level of service forecast at the SR-173/Hook Creek Road intersection. The project will be required to contribute its fair-share cost to the prescribed mitigation.

Year 2020 Plus Project Signal Warrant Analysis

Figure 8 illustrates the peak hour signal warrant graph for the intersection of SR-173/Hook Creek Road-Oak Drive for the 2020 background and 2020 plus project scenarios. As this figure shows, the intersection will have sufficient approach volumes on the major street (SR-173), and the westbound approach (Hook Creek Road) may warrant peak hour signalization under 2020 background and background plus project conditions.

Project Contribution to Total New Volumes

As part of the traffic impact analysis, the contribution of project increment traffic to total new traffic was determined for the intersection of SR-173/Hook Creek Road-Oak Drive. Table F presents the results of this analysis.

Table F: Project Contribution to Total New Traffic Volumes at Study Area Intersection

	A.M. Peak Hour					P.M. Peak Hour				
Int.	Total Existing	Total 2020	Total New	Total Project	Ratio Proj/New	Total Existing	Total 2020	Total New	Total Project	Ratio Proj/New
SR-173/ Hook Creek Road	636	1,355	719	44	6.12%	788	1,688	900	59	6.56%

The total existing and total year 2020 plus project peak hour traffic is the sum of all turn movements for the intersection's approaches. The total new traffic is the difference between the year 2020 and the existing peak hour traffic volumes. Total project traffic is the sum of the project increment peak hour traffic volume through the study area intersection. The project contribution to total new traffic is calculated by dividing the project increment by the total new traffic.

These calculations consider only the growth in traffic up to the levels of the SCAG estimates for population housing and employment for 2020. In an ultimate General Plan build out horizon, growth in traffic may exceed these volumes, reducing the percentage of contribution of the proposed project. Therefore, these percentages should be evaluated in this context before application to mitigation costs to reflect the total project fair-share contribution.

Proposed Cumberland Drive Extension Project

According to the Circulation Element of the County of San Bernardino General Plan, an extension of Cumberland Drive, south of Blue Ridge Drive, has been identified as a Primary Evacuation Route for the Town of Lake Arrowhead. According to the County Planning Department[1], the alignment shown in the General Plan is for conceptual purposes only. The County is currently in the process of analyzing a series of roadway alignments for the extension project. Once approved, it is anticipated that

1 Telephone conversation with Pat McGukian, Senior Planner, County of San Bernardino, April, 2001.

the final alignment will provide a connection from the existing terminus at Blue Ridge Drive to State Route 18 (SR-18) in the vicinity of the existing Santa's Village property.

It should be noted that the proposed project has provided the necessary right-of-way for the roadway extension project. Also, the project traffic analysis has demonstrated that the project does not create a significant impact to the local circulation system. A peak hour signal warrant analysis indicates that a traffic signal may be warranted at the SR-173/Hook Creek Road intersection in the 2020 baseline and 2020 plus project scenarios. Installation of this feasible improvement would allow for satisfactory levels of service at this intersection.

CIRCULATION IMPROVEMENTS

Based on the results of the traffic impact analysis, the following improvement is recommended to improve traffic operations at the SR-173/Hook Creek Road-Oak Drive intersection.

Signalization

The project's mitigation would be to pay its fair-share to the cost to improve the forecast operations (i.e., signalization) of SR-173/Hook Creek Road-Oak Drive. Based on the existing and year 2020 traffic volumes analyzed in this TIA, the project contribution to this intersection is 6.12 percent in the a.m. peak hour and 6.56 percent in the p.m. peak hour.

Levels of Service with Improvements

Table G presents the 2020 plus project of level of service for the study area intersection with the recommended intersection improvements (i.e., signalization).

Table G: Year 2020 Plus Project with Signalization Intersection Levels of Service

		Year 2020 + Project				Year 2020 + Project w/ Mitigation			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
SR-173/	Eastbound	36.9 sec.	E	42.5 sec.	E	14.1 sec.	B	14.4 sec.	B
Hook Creek	Westbound	>80 sec.	F	>80 sec.	F	*LOS for entire intersection*			

With the implementation of the recommended intersection improvement, the minimum level of service standard is maintained where a significant project impact was identified.

Project Fair-Share Contribution

The County of San Bernardino assumes a fixed cost of $250,000 to install a new traffic signal. As indicated in Table F, the project will contribute 6.56 percent of the new p.m. peak hour trips to the intersection of SR-173/Hook Creek Road-Oak Drive in 2020. Therefore, the project's fair-share contribution to the mitigation is [redacted]

SUMMARY AND CONCLUSIONS

This section of the report summarizes the results and conclusions of the traffic analysis for the proposed Blue Ridge at Lake Arrowhead residential development project. The key results are summarized below.

- Existing (2001) a.m. and p.m. peak hour intersection turn volumes for analysis locations were collected by LSA. The SR-173/Hook Creek Road-Oak Drive intersection is currently operating with satisfactory levels of service.
- The proposed project is estimated to generate 555 average daily trips, 44 a.m. peak hour trips, and 59 p.m. peak hour trips.
- SR-173/Hook Creek Road-Oak Drive is forecast to continue to operate with satisfactory levels of service with the addition of project trips in the existing plus project scenario for both peak hours.
- Under forecast year 2020 background (without project) conditions with the Mill Pond project, the eastbound and westbound approaches of SR-173/Hook Creek Road-Oak Drive intersection are forecast to operate at unsatisfactory (LOS F) levels of service in both the a.m. and p.m. peak hours.
- The proposed project would contribute to the unsatisfactory operation of SR-173/Hook Creek Road-Oak Drive in the 2020 plus project scenario. However, the project would not create a direct impact that results in the degradation in levels of service to a condition worse than the background (without project) condition.
- A peak hour signal warrant analysis was performed for the study area intersection. Based on the Caltrans peak hour signal warrant, SR-173/Hook Creek Road-Oak Drive is forecast to have sufficient approach volumes that may warrant signalization under 2020 background and 2020 plus project conditions.
- According to the Circulation Element of the County of San Bernardino General Plan, an extension of Cumberland Drive, south of Blue Ridge Drive, has been identified as a Primary Evacuation Route for the Town of Lake Arrowhead. The County is currently in the process of analyzing a series of roadway alignments for the extension project. It should be noted that the proposed project has provided the necessary right-of-way for the roadway extension project. Also, the project traffic analysis has demonstrated that the project does not create a significant impact to the local circulation system.
- A mitigation measure has been recommended for this intersection significantly impacted by project traffic. The improvement includes the following:

Signalization. The project's mitigation would be to pay its fair-share to the cost of improving the operations (i.e., signalization) of SR-173/Hook Creek Road-Oak Drive. Based on the existing and year 2020 traffic volumes analyzed in this TIA, the project contribution to this intersection is 6.12 percent in the a.m. peak hour and 6.56 percent in the p.m. peak hour.

Based on the County of San Bernardino's standard cost of $250,000 for installation of a new traffic signal, the project shall make a fair-share contribution of $16,400 for the future traffic signal at this location.

APPENDIX A
EXISTING PEAK HOUR INTERSECTION TURN VOLUMES

City of Lake Arrowhead
N/S: State Highway 173
E/W: Hook Creek Road
WEATHER: Sunny

COUNTS UNLIMITED, INC.
909.247.6716

File Name : ahhc173a
Site Code : 00031101
Start Date : 02/05/2001
Page No : 1

Groups Printed- TOTAL VOLUME

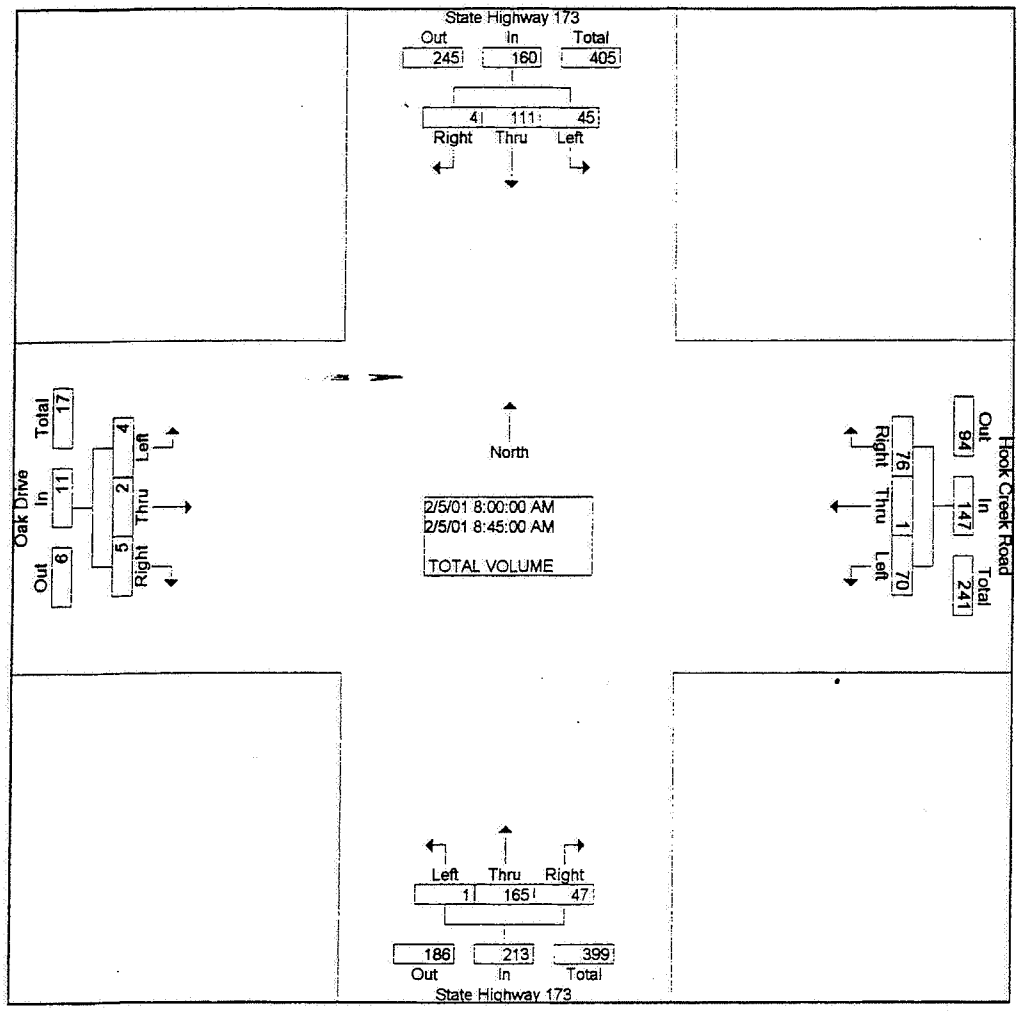
	State Highway 173 Southbound				Hook Creek Road Westbound				State Highway 173 Northbound				Oak Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
06:30 AM	3	31	0	34	10	1	3	14	0	7	5	12	0	1	1	2	62
06:45 AM	3	47	0	50	24	0	4	28	0	21	8	29	0	0	5	5	112
Total	6	78	0	84	34	1	7	42	0	28	13	41	0	1	6	7	174
07:00 AM	3	22	0	25	16	0	2	18	0	16	10	26	1	0	1	2	71
07:15 AM	5	12	0	17	14	0	4	18	1	30	15	46	1	0	1	2	83
07:30 AM	7	20	0	27	18	0	12	30	1	27	10	38	1	0	1	2	97
07:45 AM	11	28	0	39	25	0	13	38	0	39	13	52	0	0	0	0	129
Total	26	82	0	108	73	0	31	104	2	112	48	162	3	0	3	6	380
08:00 AM	7	16	1	24	10	0	7	17	0	32	13	45	1	0	0	1	87
08:15 AM	9	25	0	34	13	0	21	34	0	38	15	53	1	0	4	5	126
08:30 AM	13	24	0	37	16	1	22	39	1	50	10	61	1	1	0	2	139
08:45 AM	16	46	3	65	31	0	26	57	0	45	9	54	1	1	1	3	179
Total	45	111	4	160	70	1	76	147	1	165	47	213	4	2	5	11	531
Grand Total	77	271	4	352	177	2	114	293	3	305	108	416	7	3	14	24	1085
Apprch %	21.9	77.0	1.1		60.4	0.7	38.9		0.7	73.3	26.0		29.2	12.5	58.3		
Total %	7.1	25.0	0.4	32.4	16.3	0.2	10.5	27.0	0.3	28.1	10.0	38.3	0.6	0.3	1.3	2.2	

	State Highway 173 Southbound				Hook Creek Road Westbound				State Highway 173 Northbound				Oak Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 06:30 AM to 08:45 AM - Peak 1 of 1																	
Intersection	08:00 AM																
Volume	45	111	4	160	70	1	76	147	1	165	47	213	4	2	5	11	531
Percent	28.1	69.4	2.5		47.6	0.7	51.7		0.5	77.5	22.1		36.4	18.2	45.5		
08:45 Volume	16	46	3	65	31	0	26	57	0	45	9	54	1	1	1	3	179
Peak Factor																	0.742
High Int.	08:45 AM				08:45 AM				08:30 AM				08:15 AM				
Volume	16	46	3	65	31	0	26	57	1	50	10	61	1	0	4	5	
Peak Factor				0.615				0.645				0.873				0.550	

City of Lake Arrowhead
N/S: State Highway 173
E/W: Hook Creek Road
WEATHER: Sunny

COUNTS UNLIMITED, INC.
909.247.6716

File Name : ahhc173a
Site Code : 00031101
Start Date : 02/05/2001
Page No : 2



Peak Hour From 06:30 AM to 08:45 AM - Peak 1 of 1

By Approach	08:00 AM				08:00 AM				08:00 AM				06:30 AM			
Volume	45	111	4	160	70	1	76	147	1	165	47	213	2	1	8	11
Percent	28.1	69.4	2.5		47.6	0.7	51.7		0.5	77.5	22.1		18.2	9.1	72.7	
High Int.	08:45 AM				08:45 AM				08:30 AM				06:45 AM			
Volume	16	46	3	65	31	0	26	57	1	50	10	61	0	0	5	5
Peak Factor				0.615				0.645				0.873				0.550

City of Lake Arrowhead
N/S: State Highway 173
E/W: Hook Creek Road
WEATHER: Sunny

COUNTS UNLIMITED, INC.
909.247.6716

File Name : ahhc173p
Site Code : 00031103
Start Date : 02/06/2001
Page No : 1

Groups Printed- TOTAL VOLUME

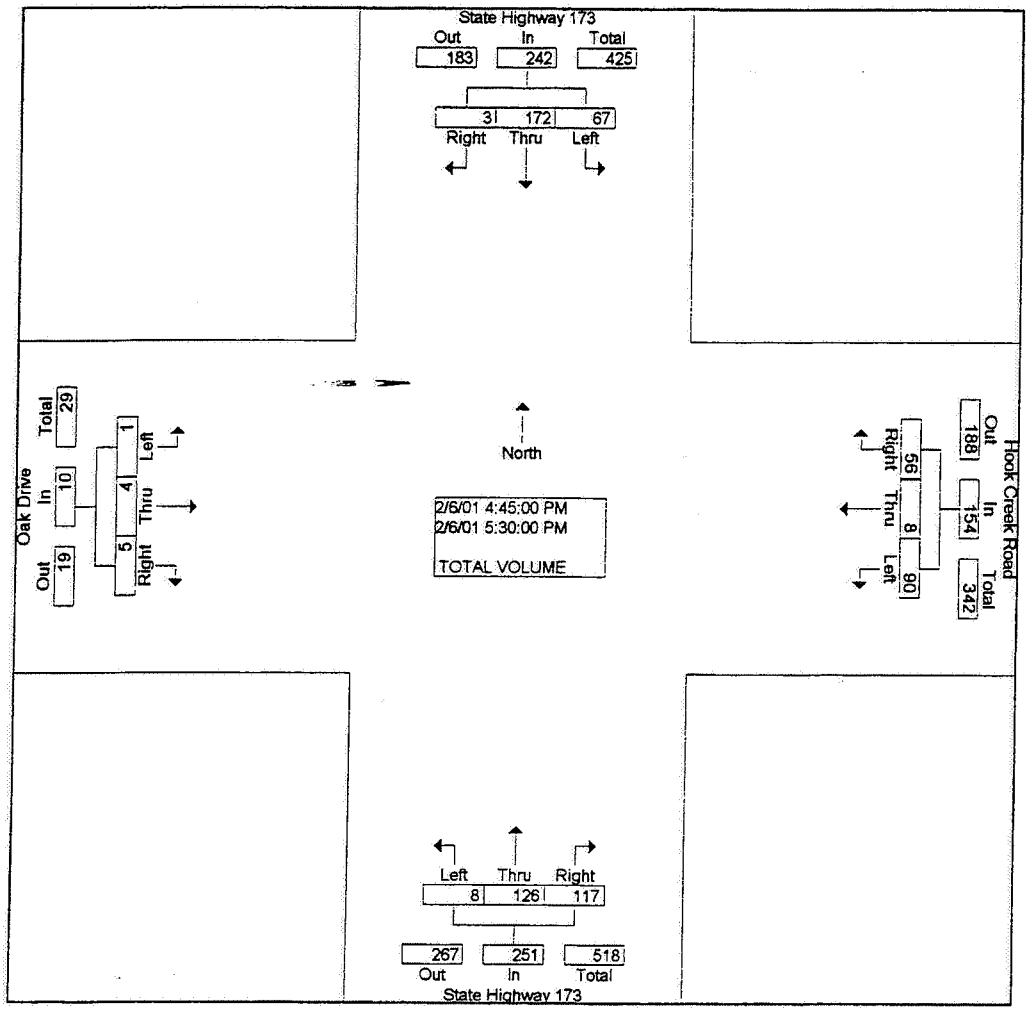
	State Highway 173 Southbound				Hook Creek Road Westbound				State Highway 173 Northbound				Oak Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
04:00 PM	6	34	0	40	24	3	19	46	0	40	38	78	0	0	1	1	165
04:15 PM	25	57	3	85	28	1	16	45	0	38	26	64	0	0	0	0	194
04:30 PM	20	26	0	46	26	0	10	36	2	28	22	52	0	0	1	1	135
04:45 PM	25	40	0	65	23	1	13	37	3	26	21	50	0	1	1	2	154
Total	76	157	3	236	101	5	58	164	5	132	107	244	0	1	3	4	648
05:00 PM	11	44	1	56	16	0	19	35	1	31	27	59	0	1	1	2	152
05:15 PM	21	51	1	73	29	4	12	45	2	32	39	73	0	1	2	3	194
05:30 PM	10	37	1	48	22	3	12	37	2	37	30	69	1	1	1	3	157
05:45 PM	12	20	0	32	11	0	6	17	1	25	17	43	1	0	0	1	93
Total	54	152	3	209	78	7	49	134	6	125	113	244	2	3	4	9	596
Grand Total	130	309	6	445	179	12	107	298	11	257	220	488	2	4	7	13	1244
Apprch %	29.2	69.4	1.3		60.1	4.0	35.9		2.3	52.7	45.1		15.4	30.8	53.8		
Total %	10.5	24.8	0.5	35.8	14.4	1.0	8.6	24.0	0.9	20.7	17.7	39.2	0.2	0.3	0.6	1.0	

	State Highway 173 Southbound				Hook Creek Road Westbound				State Highway 173 Northbound				Oak Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Intersection	04:45 PM																
Volume	67	172	3	242	90	8	56	154	8	126	117	251	1	4	5	10	657
Percent	27.7	71.1	1.2		58.4	5.2	36.4		3.2	50.2	46.6		10.0	40.0	50.0		
05:15 Volume	21	51	1	73	29	4	12	45	2	32	39	73	0	1	2	3	194
Peak Factor																	0.847
High Int.	05:15 PM				05:15 PM				05:15 PM				05:15 PM				
Volume	21	51	1	73	29	4	12	45	2	32	39	73	0	1	2	3	
Peak Factor				0.829				0.856				0.860				0.833	

City of Lake Arrowhead
N/S: State Highway 173
E/W: Hook Creek Road
WEATHER: Sunny

COUNTS UNLIMITED, INC.
909.247.6716

File Name : ahhc173p
Site Code : 00031103
Start Date : 02/06/2001
Page No : 2



Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1

By Approach	04:15 PM				04:00 PM				04:45 PM				04:45 PM			
Volume	81	167	4	252	101	5	58	164	8	126	117	251	1	4	5	10
Percent	32.1	66.3	1.6		61.6	3.0	35.4		3.2	50.2	46.6		10.0	40.0	50.0	
High Int.	04:15 PM				04:00 PM				05:15 PM				05:15 PM			
Volume	25	57	3	85	24	3	19	46	2	32	39	73	0	1	2	3
Peak Factor				0.741				0.891				0.860				0.833

APPENDIX B
INTERSECTION LEVEL OF SERVICE ANALYSIS WORKSHEETS

EXISTING (2001) CONDITIONS

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Steven Greene*	Intersection	*SR-173/Hook Creek Road*
Agency/Co.	*LSA Associates, Inc.*	Jurisdiction	*County of San Bernardino*
Date Performed	*2/7/02*	Analysis Year	*Peak Season - 2001*
Analysis Time Period	*AM Peak Hour*		
Project Description	*Blue Ridge Residential Development*		
East/West Street:	*Hook Creek Road-Oak Drive*	North/South Street:	*State Route 173*
Intersection Orientation:	*North-South*	Study Period (hrs):	*1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*1*	*198*	*56*	*54*	*133*	*5*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*1*	*198*	*56*	*54*	*133*	*5*
Percent Heavy Vehicles	*0*	–	–	*0*	–	–
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*84*	*1*	*91*	*5*	*2*	*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*84*	*1*	*91*	*5*	*2*	*6*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*1*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (vph)	*1*	*54*		*176*			*13*	
C (m) (vph)	*1458*	*1323*		*1769*			*558*	
v/c	*0.00*	*0.04*		*0.10*			*0.02*	
95% queue length	*0.00*	*0.13*		*0.33*			*0.07*	
Control Delay	*7.5*	*7.8*		*7.3*			*11.6*	
LOS	*A*	*A*		*A*			*B*	
Approach Delay	–	–	*7.3*			*11.6*		
Approach LOS	–	–	*A*			*B*		

>

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Steven Greene*	Intersection	*SR-173/Hook Creek Road*
Agency/Co.	*LSA Associates, Inc.*	Jurisdiction	*County of San Bernardino*
Date Performed	*2/7/02*	Analysis Year	*Peak Season - 2001*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Blue Ridge Residential Development*		
East/West Street:	*Hook Creek Road-Oak Drive*	North/South Street:	*State Route 173*
Intersection Orientation:	*North-South*	Study Period (hrs):	*1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*10*	*151*	*140*	*80*	*206*	*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*10*	*151*	*140*	*80*	*206*	*4*
Percent Heavy Vehicles	*0*	–	–	*0*	–	–
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*108*	*10*	*67*	*1*	*5*	*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*108*	*10*	*67*	*1*	*5*	*6*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*1*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (vph)	*10*	*80*		*185*			*12*	
C (m) (vph)	*1373*	*1282*		*1022*			*486*	
v/c	*0.01*	*0.06*		*0.18*			*0.02*	
95% queue length	*0.02*	*0.20*		*0.66*			*0.08*	
Control Delay	*7.6*	*8.0*		*9.3*			*12.6*	
LOS	*A*	*A*		*A*			*B*	
Approach Delay	–	–	*9.3*			*12.6*		
Approach LOS	–	–	*A*			*B*		

>

EXISTING PLUS PROJECT

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Steven Greene*	Intersection	*SR-173/Hook Creek Road*
Agency/Co.	*LSA Associates, Inc.*	Jurisdiction	*County of San Bernardino*
Date Performed	*2/7/02*	Analysis Year	*Existing Peak + Project*
Analysis Time Period	*AM Peak Hour*		
Project Description	*Blue Ridge Residential Development*		
East/West Street:	*Hook Creek Road-Oak Drive*	North/South Street:	*State Route 173*
Intersection Orientation:	*North-South*	Study Period (hrs):	*1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*1*	*198*	*64*	*57*	*133*	*5*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*1*	*198*	*64*	*57*	*133*	*5*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*107*	*1*	*101*	*5*	*2*	*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*107*	*1*	*101*	*5*	*2*	*6*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*1*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (vph)	*1*	*57*		*209*			*13*	
C (m) (vph)	*1458*	*1314*		*1749*			*544*	
v/c	*0.00*	*0.04*		*0.12*			*0.02*	
95% queue length	*0.00*	*0.14*		*0.41*			*0.07*	
Control Delay	*7.5*	*7.9*		*7.3*			*11.8*	
LOS	*A*	*A*		*A*			*B*	
Approach Delay	--	--	*7.3*			*11.8*		
Approach LOS	--	--	*A*			*B*		

>

Version 4.1b

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Steven Greene*
Agency/Co.	*LSA Associates, Inc.*
Date Performed	*2/7/02*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*SR-173/Hook Creek Road*
Jurisdiction	*County of San Bernardino*
Analysis Year	*Existing Peak + Project*

Project Description: *Blue Ridge Residential Development*

East/West Street: *Hook Creek Road-Oak Drive* | North/South Street: *State Route 173*

Intersection Orientation: *North-South* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*10*	*151*	*167*	*91*	*206*	*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*10*	*151*	*167*	*91*	*206*	*4*
Percent Heavy Vehicles	*0*	–	–	*0*	–	–
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*123*	*10*	*73*	*1*	*5*	*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*123*	*10*	*73*	*1*	*5*	*6*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*1*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (vph)	*10*	*91*		*206*			*12*	
C (m) (vph)	*1373*	*1253*		*979*			*461*	
v/c	*0.01*	*0.07*		*0.21*			*0.03*	
95% queue length	*0.02*	*0.23*		*0.80*			*0.08*	
Control Delay	*7.6*	*8.1*		*9.7*			*13.0*	
LOS	*A*	*A*		*A*			*B*	
Approach Delay	–	–	*9.7*			*13.0*		
Approach LOS	–	–	*A*			*B*		

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YEAR 2020 BACKGROUND CONDITIONS

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Steven Greene*
Agency/Co.	*LSA Associates, Inc.*
Date Performed	*2/7/02*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*SR-173/Hook Creek Road*
Jurisdiction	*County of San Bernardino*
Analysis Year	*Year 2020 + Mill Pond*

Project Description *Blue Ridge Residential Development*

East/West Street: *Hook Creek Road-Oak Drive* | North/South Street: *State Route 173*

Intersection Orientation: *North-South* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*330*	*109*	*179*	*235*	*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*0*	*330*	*109*	*179*	*235*	*6*
Percent Heavy Vehicles	*0*	–	–	*0*	–	–
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*152*	*1*	*286*	*8*	*2*	*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*152*	*1*	*286*	*8*	*2*	*4*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*1*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (vph)	*0*	*179*		*439*			*14*	
C (m) (vph)	*1337*	*1132*		*538*			*134*	
v/c	*0.00*	*0.16*		*0.82*			*0.10*	
95% queue length	*0.00*	*0.56*		*10.90*			*0.35*	
Control Delay	*7.7*	*8.8*		*39.1*			*35.0-*	
LOS	*A*	*A*		*E*			*D*	
Approach Delay	–	–	*39.1*			*35.0-*		
Approach LOS	–	–	*E*			*D*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Steven Greene*	Intersection	*SR-173/Hook Creek Road*
Agency/Co.	*LSA Associates, Inc.*	Jurisdiction	*County of San Bernardino*
Date Performed	*2/7/02*	Analysis Year	*Year 2020 + Mill Pond*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Blue Ridge Residential Development*		
East/West Street:	*Hook Creek Road-Oak Drive*	North/South Street:	*State Route 173*
Intersection Orientation:	*North-South*	Study Period (hrs):	*1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*6*	*243*	*285*	*285*	*329*	*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*6*	*243*	*285*	*285*	*329*	*6*
Percent Heavy Vehicles	*0*	–	–	*0*	–	–
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*218*	*12*	*233*	*1*	*6*	*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*218*	*12*	*233*	*1*	*6*	*4*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*1*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (vph)	*6*	*285*		*463*			*11*	
C (m) (vph)	*1236*	*1049*		*174*			*117*	
v/c	*0.00*	*0.27*		*2.66*			*0.09*	
95% queue length	*0.01*	*1.12*		*149.16*			*0.31*	
Control Delay	*7.9*	*9.7*					*39.0*	
LOS	*A*	*A*		*F*			*E*	
Approach Delay	–	–					*39.0*	
Approach LOS	–	–		*F*			*E*	

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Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #1 SR-173/Hook Creek Road [Year 2020 Baseline]

Cycle (sec):	80	Critical Vol./Cap. (X):	0.491
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh):	13.7
Optimal Cycle:	70	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0	0	0 1!	0	0	0 1!	0	0	0 1!	0	0	0 1!
Volume Module: AM Peak Hour												
Base Vol:	0	330	109	179	235	6	8	2	4	152	1	286
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	330	109	179	235	6	8	2	4	152	1	286
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	0	347	115	188	247	6	8	2	4	160	1	301
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	347	115	188	247	6	8	2	4	160	1	301
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	347	115	188	247	6	8	2	4	160	1	301
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	0.00	0.75	0.25	0.44	0.55	0.01	0.58	0.14	0.28	0.35	0.01	0.64
Final Sat.:	0	1427	473	791	1040	25	1052	263	526	646	4	1215
Capacity Analysis Module:												
Vol/Sat:	0.00	0.24	0.24	0.24	0.24	0.24	0.01	0.01	0.01	0.25	0.25	0.25
Crit Moves:		****									****	
Green/Cycle:	0.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Volume/Cap:	0.00	0.49	0.49	0.48	0.48	0.48	0.02	0.02	0.02	0.49	0.49	0.49
Uniform Del:	0.0	13.5	13.5	13.4	13.4	13.4	9.9	9.9	9.9	13.0	13.0	13.0
IncremntDel:	0.0	0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.4	0.4	0.4
Delay Adj:	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	0.0	13.9	13.9	13.8	13.8	13.8	9.9	9.9	9.9	13.4	13.4	13.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	13.9	13.9	13.8	13.8	13.8	9.9	9.9	9.9	13.4	13.4	13.4
DesignQueue:	0	8	3	4	6	0	0	0	0	4	0	7

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #1 SR-173/Hook Creek Road [Year 2020 Baseline]

Cycle (sec): 80 Critical Vol./Cap. (X): 0.615
Loss Time (sec): 0 (Y+R = 4 sec) Average Delay (sec/veh): 13.8
Optimal Cycle: 70 Level Of Service: B

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	- T	- R		L	- T	- R		L	- T	- R		L	- T	- R	
Control:	Permitted				Permitted				Permitted				Permitted			
Rights:	Include				Include				Include				Include			
Min. Green:	0	0	0		0	0	0		0	0	0		0	0	0	
Lanes:	0	0 1!	0	0	0	0 1!	0	0	0	0 1!	0	0	0	0 1!	0	0
Volume Module: PM Peak Hour																
Base Vol:	6	243	285	285	329	6	1	6	4	218	12	233				
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
Initial Bse:	6	243	285	285	329	6	1	6	4	218	12	233				
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95				
PHF Volume:	6	256	300	300	346	6	1	6	4	229	13	245				
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0				
Reduced Vol:	6	256	300	300	346	6	1	6	4	229	13	245				
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
Final Vol.:	6	256	300	300	346	6	1	6	4	229	13	245				
Saturation Flow Module:																
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900				
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00				
Lanes:	0.01	0.46	0.53	0.47	0.52	0.01	0.10	0.54	0.36	0.48	0.03	0.49				
Final Sat.:	20	865	1014	852	983	17	172	1031	687	871	49	932				
Capacity Analysis Module:																
Vol/Sat:	0.30	0.30	0.30	0.35	0.35	0.35	0.01	0.01	0.01	0.26	0.26	0.26				
Crit Moves:					****						****					
Green/Cycle:	0.57	0.57	0.57	0.57	0.57	0.57	0.43	0.43	0.43	0.43	0.43	0.43				
Volume/Cap:	0.52	0.52	0.52	0.61	0.61	0.61	0.01	0.01	0.01	0.61	0.61	0.61				
Uniform Del:	10.4	10.4	10.4	11.3	11.3	11.3	13.2	13.2	13.2	17.8	17.8	17.8				
IncremntDel:	0.4	0.4	0.4	1.1	1.1	1.1	0.0	0.0	0.0	1.5	1.5	1.5				
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
Delay/Veh:	10.8	10.8	10.8	12.4	12.4	12.4	13.2	13.2	13.2	19.2	19.2	19.2				
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
AdjDel/Veh:	10.8	10.8	10.8	12.4	12.4	12.4	13.2	13.2	13.2	19.2	19.2	19.2				
DesignQueue:	0	5	6	6	7	0	0	0	0	6	0	7				

YEAR 2020 PLUS PROJECT

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Steven Greene*	Intersection	*SR-173/Hook Creek Road*
Agency/Co.	*LSA Associates, Inc.*	Jurisdiction	*County of San Bernardino*
Date Performed	*2/7/02*	Analysis Year	*2020 + Project*
Analysis Time Period	*AM Peak Hour*		
Project Description	*Blue Ridge Residential Development*		
East/West Street:	*Hook Creek Road-Oak Drive*	North/South Street:	*State Route 173*
Intersection Orientation:	*North-South*	Study Period (hrs):	*1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*330*	*117*	*182*	*235*	*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*0*	*330*	*117*	*182*	*235*	*6*
Percent Heavy Vehicles	*0*	–	–	*0*	–	–
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*175*	*1*	*296*	*8*	*2*	*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*175*	*1*	*296*	*8*	*2*	*4*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*1*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (vph)	*0*	*182*		*472*			*14*	
C (m) (vph)	*1337*	*1124*		*434*			*127*	
v/c	*0.00*	*0.16*		*1.09*			*0.11*	
95% queue length	*0.00*	*0.58*		*37.75*			*0.37*	
Control Delay	*7.7*	*8.8*		*241.9*			*36.9*	
LOS	*A*	*A*		*F*			*E*	
Approach Delay	–	–	*241.9*			*36.9*		
Approach LOS	–	–	*F*			*E*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Steven Greene*	Intersection	*SR-173/Hook Creek Road*
Agency/Co.	*LSA Associates, Inc.*	Jurisdiction	*County of San Bernardino*
Date Performed	*2/7/02*	Analysis Year	*2020 + Project*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Blue Ridge Residential Development*		
East/West Street:	*Hook Creek Road-Oak Drive*	North/South Street:	*State Route 173*
Intersection Orientation:	*North-South*	Study Period (hrs):	*1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*6*	*243*	*312*	*296*	*329*	*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*6*	*243*	*312*	*296*	*329*	*6*
Percent Heavy Vehicles	*0*	–	–	*0*	–	–
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*233*	*12*	*239*	*1*	*6*	*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*233*	*12*	*239*	*1*	*6*	*4*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*1*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (vph)	*6*	*296*		*484*			*11*	
C (m) (vph)	*1236*	*1026*		*157*			*107*	
v/c	*0.00*	*0.29*		*3.08*			*0.10*	
95% queue length	*0.01*	*1.21*		*167.83*			*0.34*	
Control Delay	*7.9*	*9.9*					*42.5*	
LOS	*A*	*A*		*F*			*E*	
Approach Delay	–	–					*42.5*	
Approach LOS	–	–		*F*			*E*	

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Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #2 SR-173/Hook Creek Road [Year 2020 Plus Project]

Cycle (sec): 80 Critical Vol./Cap. (X): 0.514
Loss Time (sec): 0 (Y+R = 4 sec) Average Delay (sec/veh): 14.1
Optimal Cycle: 80 Level Of Service: B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0	0 1	0	0 0	1! 0	0	0 0	1! 0	0	0 0	1! 0	0
Volume Module: AM Peak Hour												
Base Vol:	0	330	117	182	235	6	8	2	4	175	1	296
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	330	117	182	235	6	8	2	4	175	1	296
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	0	347	123	192	247	6	8	2	4	184	1	312
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	347	123	192	247	6	8	2	4	184	1	312
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	347	123	192	247	6	8	2	4	184	1	312
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	0.00	0.74	0.26	0.44	0.55	0.01	0.58	0.14	0.28	0.38	0.01	0.61
Final Sat.:	0	1403	497	801	1030	25	1052	263	526	689	4	1169
Capacity Analysis Module:												
Vol/Sat:	0.00	0.25	0.25	0.24	0.24	0.24	0.01	0.01	0.01	0.27	0.27	0.27
Crit Moves:		****									****	
Green/Cycle:	0.00	0.48	0.48	0.48	0.48	0.48	0.52	0.52	0.52	0.52	0.52	0.52
Volume/Cap:	0.00	0.51	0.51	0.50	0.50	0.50	0.01	0.01	0.01	0.51	0.51	0.51
Uniform Del:	0.0	14.3	14.3	14.2	14.2	14.2	9.3	9.3	9.3	12.6	12.6	12.6
IncremntDel:	0.0	0.5	0.5	0.4	0.4	0.4	0.0	0.0	0.0	0.5	0.5	0.5
Delay Adj:	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	0.0	14.8	14.8	14.6	14.6	14.6	9.3	9.3	9.3	13.1	13.1	13.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	14.8	14.8	14.6	14.6	14.6	9.3	9.3	9.3	13.1	13.1	13.1
DesignQueue:	0	9	3	5	6	0	0	0	0	4	0	7

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #2 SR-173/Hook Creek Road [Year 2020 Plus Project]

Cycle (sec): 80 Critical Vol./Cap. (X): 0.634
Loss Time (sec): 0 (Y+R = 4 sec) Average Delay (sec/veh): 14.4
Optimal Cycle: 80 Level Of Service: B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0	1!	0 0	0 0	1!	0 0	0 0	1!	0 0	0 0	1!	0 0
Volume Module: PM Peak Hour												
Base Vol:	6	243	312	296	329	6	1	6	4	233	12	239
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	6	243	312	296	329	6	1	6	4	233	12	239
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	6	256	328	312	346	6	1	6	4	245	13	252
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	6	256	328	312	346	6	1	6	4	245	13	252
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	6	256	328	312	346	6	1	6	4	245	13	252
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	0.01	0.43	0.56	0.48	0.51	0.01	0.10	0.54	0.36	0.50	0.02	0.48
Final Sat.:	19	824	1056	870	965	17	172	1031	687	889	47	914
Capacity Analysis Module:												
Vol/Sat:	0.31	0.31	0.31	0.36	0.36	0.36	0.01	0.01	0.01	0.28	0.28	0.28
Crit Moves:					****						****	
Green/Cycle:	0.57	0.57	0.57	0.57	0.57	0.57	0.43	0.43	0.43	0.43	0.43	0.43
Volume/Cap:	0.55	0.55	0.55	0.63	0.63	0.63	0.01	0.01	0.01	0.63	0.63	0.63
Uniform Del:	11.0	11.0	11.0	11.8	11.8	11.8	12.9	12.9	12.9	17.7	17.7	17.7
IncremntDel:	0.6	0.6	0.6	1.3	1.3	1.3	0.0	0.0	0.0	1.7	1.7	1.7
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	11.6	11.6	11.6	13.1	13.1	13.1	12.9	12.9	12.9	19.3	19.3	19.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	11.6	11.6	11.6	13.1	13.1	13.1	12.9	12.9	12.9	19.3	19.3	19.3
DesignQueue:	0	5	7	7	7	0	0	0	0	7	0	7

APPENDIX C
FUTURE VOLUME FORECAST METHODOLOGY WORKSHEETS

Table C-5 - Calculation of Future Direcitonal Turn Volumes From Future Directional Link Volumes (NCHRP 255)

Intersection No.: 1
Intersection: SR-173/Hook Creek Road

Condition: Year 2020 Base Conditions

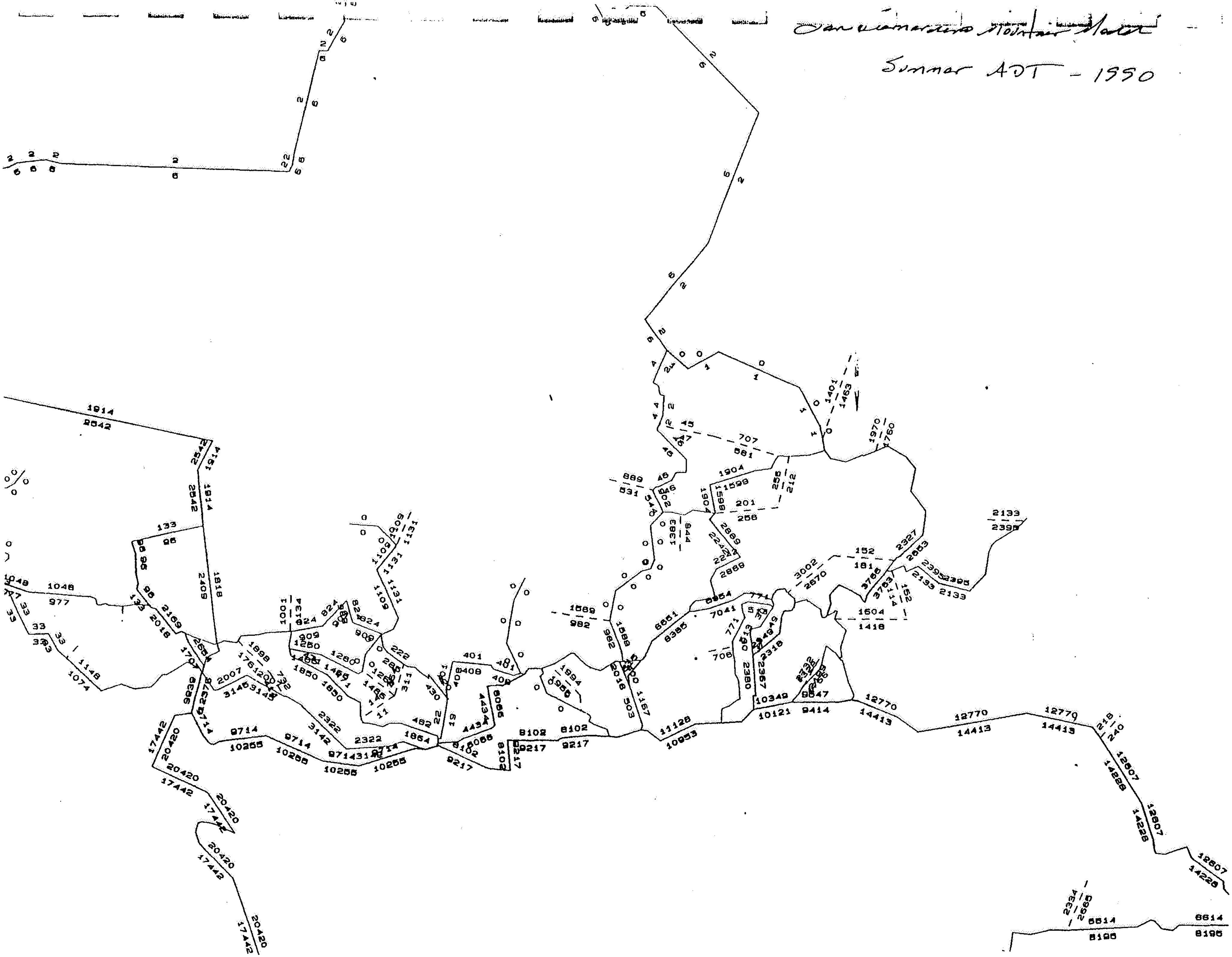
A.M. Peak Hour

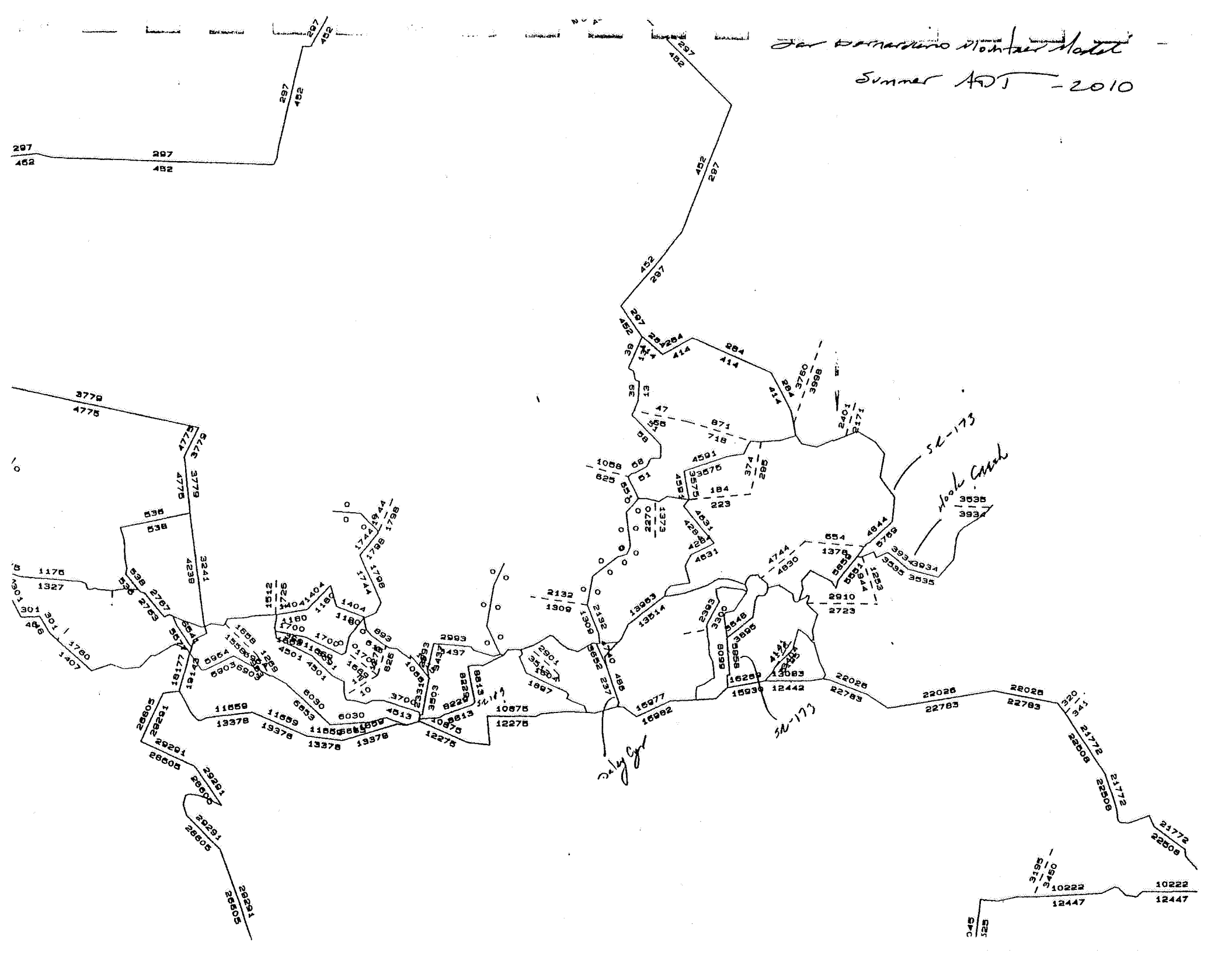
Approach Direction		Base Year Count	Forecast Future Year Link Volume		Forecast Future Year Turn Volume	
Northbound	Left	1	Approach	380	Left	0
	Through	198	Departure	332	Through	330
	Right	56			Right	60
Southbound	Left	54	Approach	391	Left	158
	Through	133	Departure	599	Through	235
	Right	5			Right	6
Eastbound	Left	5	Approach	13	Left	8
	Through	2	Departure	7	Through	2
	Right	6			Right	4
Westbound	Left	84	Approach	346	Left	94
	Through	1	Departure	220	Through	1
	Right	91			Right	261

P.M. Peak Hour

Approach Direction		Base Year Count	Forecast Future Year Link Volume		Forecast Future Year Turn Volume	
Northbound	Left	10	Approach	448	Left	6
	Through	151	Departure	477	Through	243
	Right	140			Right	191
Southbound	Left	80	Approach	591	Left	245
	Through	206	Departure	446	Through	329
	Right	4			Right	6
Eastbound	Left	1	Approach	12	Left	1
	Through	5	Departure	24	Through	6
	Right	6			Right	4
Westbound	Left	108	Approach	364	Left	144
	Through	10	Departure	442	Through	12
	Right	67			Right	201

Summer ADT - 1990




San Bernardino Mountains Motel
Summer ADT - 2010
SR-173
Hook Creek
Daley Cyn

APPENDIX D
MILL POND TRAFFIC ASSIGNMENT

MILL POND
at Lake Arrowhead

TRAFFIC STUDY
TENTATIVE TRACT NO. 15740
COUNTY OF SAN BERNARDINO

PREPARED FOR:
MILLPOND PARTNERS DEVELOPMENT L.P.
55-825 Congressional
La Quinta, California 92253

PREPARED BY:
LAWRENCE EISENHART
CONSULTING ENGINEER
2048 Orange Tree Lane, Suite 208
Redlands, California 92374
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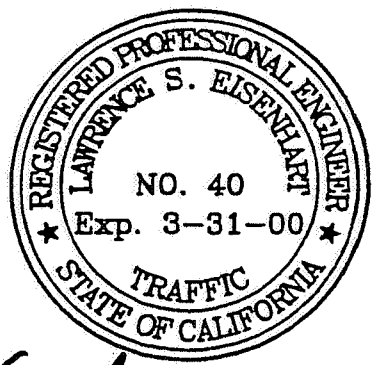


Lawrence S. Eisenhart 7/23/96
LAWRENCE S. EISENHART DATE

TRIP GENERATION:

Trip generation factors for various land uses have been established from studies made by governmental agencies, research institutes and consulting traffic engineers nationwide. These data have been complied in the Institute of Transportation engineer's publication, "TRIP GENERATION, 5TH EDITION", 1991, the most current edition.

Factors used in this study are included in the APPENDIX.

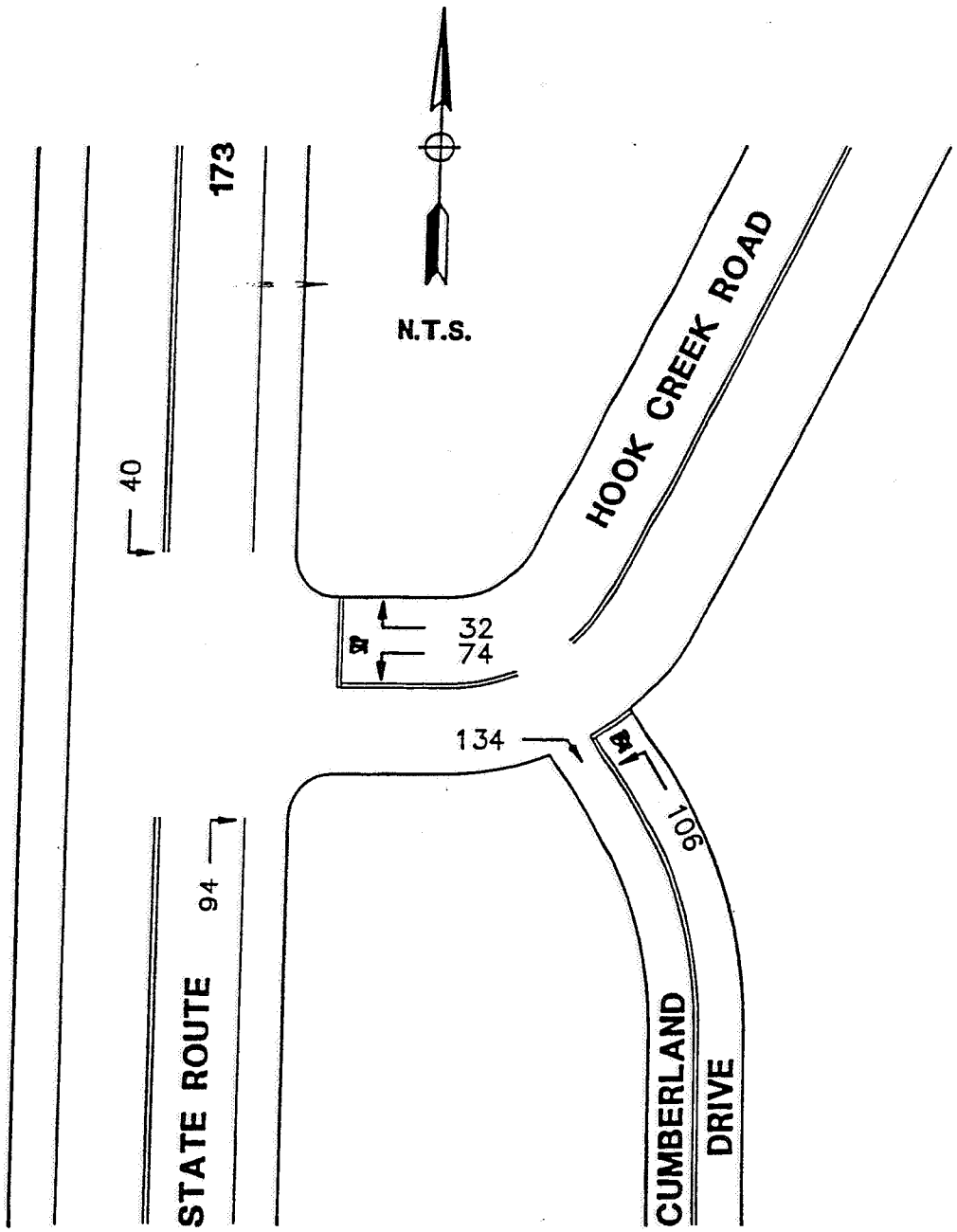
Using the trip generation factors the table below shows the calculated trips used in this study.

LAND USE	SIZE	PK. HR. FACTOR	TOTAL	ENTER	EXIT
SINGLE FAMILY DETACHED HOUSING (210)	* 75 D.U.	1.01	76	64% 49	36% 27
BED AND BREAKFAST COTTAGES (330)	12 RMS.	0.48	6	37% 2	63% 4
SPECIALTY RETAIL CENTER (814)	9 TSF.	4.93	44	57% 25	43% 19
HIGH-TURNOVER (SIT-DOWN) RESTAURANT (832)	150 STS.	0.59	88	54% 48	46% 41
QUALITY RESTAURANT (831)	48 STS.	0.23	11	70% 8	30% 3
OFFICE (710)	4 TSF.	3.40	14	17% 2	83% 12
TOTAL			240	134	106

* 6 OF THE DWELLING UNITS WILL EXIT VIA FREMONT DRIVE.

LEGEND:
D.U. = DWELLING UNITS
RMS. = ROOMS
STS. = SEATS
TSF. = THOUSAND SQUARE FEET

SOURCE: ITE "TRIP GENERATION", 5TH EDITION, 1991.



TRIP DISTRIBUTION

Figure 7